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COMPUTERWORLD
OA

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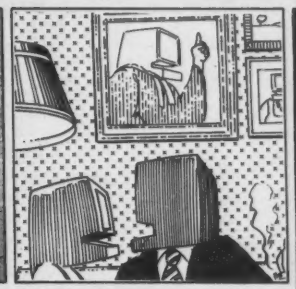


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EDITORIAL

We've come a long way in a short time.

MIS has been learning the hard way about responding to user needs. Jolted out of its ivory tower, MIS is being made to recognize that DP has a purpose greater than just processing data: It must provide more and better information to help fulfill the organization's overall business needs.

A little more than a year ago, MIS woke up to find that, unbeknownst to them, dozens, sometimes hundreds, of computers had entered their organizations. Users had started the microcomputer revolution without MIS — frequently in a deliberate effort to circumvent the computer professionals.

All too often, MIS didn't take kindly to what was happening. MIS not only disliked the invasion of its turf, it also viewed the micro as an added complication, rather than what it really was — an asset to help them into the world of corporate planning. But events in end-user computing have moved so fast over the last 12 months that MIS has — willingly or unwillingly — been jettisoned along. Micros have been the driving force in OA, but they are only part of the total OA strategy. The OA plannng strategy, itself, is undergoing some rapid changes.

More than half the large corporations responding to a recent study by The Omni Group, Ltd of New York already have strategic plans for OA. What's more, 85% of the Fortune 500 companies that responded to the survey stated they would have such strategic plans in place within the next year.

Information like this indicates that top management and MIS alike are recognizing the need to plan for and monitor OA — not only from a purchasing aspect, but also for its overall business impact. Policies being developed apply not just to individual departments, but to the whole company — an indication companies are finally recognizing and dealing with uncontrolled equipment purchases. Top management's commitment to OA seems stronger and more educated; this change in attitude can only result in good things for individual organizations and for the whole industry.

The Omni survey showed that, increasingly, OA policy is being decided by a committee of individuals representing different areas and concerns or by single departments charged with creating an OA strategy. In either case, MIS is still involved in formulating policy. In medium-size and small companies, top management is more closely involved in the decision-making process and users are takingan increasingly greater role in the purchase of OA systems. The vendor must now sell to many different audiences and must satisfy a growing number of different needs — not an easy task. In turn, the MIS manager must build bridges with both management and users in order to remain instrumental in the decision-making process and not lose any bargaining power.

LETTERS

NO JOKE!

Are you kidding? Weekly publication of *Computerworld OA*? ["Where's OA?" CW OA, April 11, 1984.]

As it is, CW OA is perfect. I look forward to receiving it and devouring it.

I do not need more magazines piled on my desk with the same advertisements and hurried newsy reporting.

Office automation is such a new and varied subject that a good well-written article dealing with principles and fundamental topics can be valuable and even considered current for several years. I use past and current issues of CW OA as an educational resource.

I want substance, not flash. CW OA provides that. Please . . . don't change a thing.

Nancy L. Holmes
Office Automation Officer
Key Bank of Northern New York N.A.
Watertown, N.Y.

STARS

"Elementary," in the April 20, 1983, issue of *Computerworld OA*, refers to the Xerox Corp. 8010 workstation as "Star," the registered trademark of Cuadra Associates, Inc. for a business computer software product that can be used in a number of work contexts, including workstations.

Our registered trademark is recognized in the marketplace as referring to both the computer program Cuadra Associates sells and to the turnkey systems that embody the Star program. Both the Star program and Star-based turnkey systems are sold only by Cuadra Associates.

We have informed Xerox that Star is our registered trademark. In its reply Xerox informed us that, although it used the term "Star" internally and privately during the development of its 8010 workstation, Xerox used the term "Xerox 8010" when it introduced the workstation commercially.

Xerox further advised us that its new workstation will be identified hereafter with the Xerox name and that it has no intention of using "Star" as nomenclature to identify its video terminal workstation or any other device.

You can appreciate that continued use by your publication of the term "Star" to identify the Xerox 8010 workstation will inevitably result in confusion. Evidence that we have suffered some damage as a result of the confusion of brand names already exists. In future, please reserve the registered trademark Star for the business computer programs and associated softare products of Cuadra Associates.

Anything you can do to remove or reduce the amount of confusion that already exists would be greatly appreciated.

Carlos A. Cuadra
President
Cuadra Associates, Inc.
Santa Monica, Calif.

STANLEY

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OA NEWS

OA IN LA

One record will definitely be broken at the XXIII Olympiad in Los Angeles: most computing power ever at an Olympic Games. In fact, according to Jim Murray, associate vice-president of technology for the Los Angeles Olympic Organizing Committee, these summer games will use more computers than all other Olympics combined.

Amid the Olympian effort it is taking for the 50,000 officials, staffers and volunteers to stage the Summer Games (which begin July 28), office automation and telecommunications are playing a significant role. IBM, for example, has donated more than 200 Personal Computers and 200 Displaywriters for use by the 1,200-member Olympic Organizing Committee staff in budgeting, planning and scheduling the games. The PCs will also be used for scoring related functions in such sports as archery.

IBM has also donated three System 38 mainframes and countless 3270 terminals, which will be placed at virtually all sport venues for instant transmission of results back to the mainframe.

Xerox Corp. has donated a number of its 2700 laser printers to be accessed off the mainframe for producing quality facts and results sheets for the press and other officials.

AT&T Communications has created a mammoth electronic messaging system that will allow all accredited athletes, officials and staff people to send messages around the 4,500-square mile Olympic venue. The electronic messaging system donated by AT&T includes 14 AT&T 3B20S superminicomputers running the Unix operating system; 1,700 AT&T Teletype Corp. 5410 terminals and 300 Teletype printers.

According to Murray, the system will offer a bulletin board of important information, such as starting times, results and schedules. "There will be terminals all over the place, including offices, residences, dorms and on certain streets." Messages will be available in both English and French with Help screens in Spanish and German as well. Virtually every one of the 4,000 coaches, 12,000 athletes and 3,000 national and international officials will find himself interacting with computers in one form or another.

The electronic messaging system will also permit the press to send stories or messages within the Olympic site and throughout the world via links to the International Telex system.

IBM has also rewritten the specifications for its Audio Distribution System to create a voice messaging system for the 16,000 athletes and coaches. The Olympic Messaging System will have instructions available in 10 languages and will be interfaced with PCs distributed around the Olympic village. The PCs, with color displays, will constantly click up messages that can be answered with a basic Touch-Tone phone. According to Murray, the last thing an athlete has time for is to learn a computer system, so the Olympic Messaging System has been designed to be extremely friendly. "You can dial in from any phone," Murray explained, "and just punch in your name and password and the system talks to you. It will play your message and ask if you wish to leave a reply."

PORTABLES REDUX

During a recent two-week time period, two major computer companies entered the portable microcomputer market, while another major player announced it was getting out. Despite the indications that it is a healthy and prosperous market, the portable computer arena is a perilous one at best.

The numbers are enticing though. Future Computing, Inc. — the Richardson, Texas, research firm — predicts the portable market will reach $1.4 billion by the end of this year and $5.6 billion by 1989. The portable market is broken into three segments: transportables, briefcase and notebook-size units. Future Computing forecasts that combined sales will exceed 600,000 total units in 1984, with total sales hitting 3 million units in five years. The briefcase and notebook seg-

ments are projected to be the most promising.

Success stories, such as Compaq Computer Corp. and Non-Linear Systems, Inc.'s Kaypro II, which have prospered in the portable market, have drawn considerable attention. IBM recently put the stamp of legitimacy on the whole market by introducing a portable version of its PC, and Apple Computer, Inc. and Hewlett-Packard Co. also jumped into the market recently. Even AT&T, which has yet to market a desktop micro, has indicated it will peddle a portable.

A portable does not ensure success, however. Osborne Computer Corp., the company credited with unleashing this portable-mania three years ago, declared bankruptcy, as did Computer Devices, Inc. Only months after announcing a briefcase-size 1810 portable, Xerox Corp. has thrown in the towel and pulled the product off the market.

Companies such as Grid Systems Corp., Gavilan Computers, Inc., Tandy Corp., Epson America, Inc. and NEC Information Systems, Inc., have all experienced lagging sales or delays in getting the products to market.

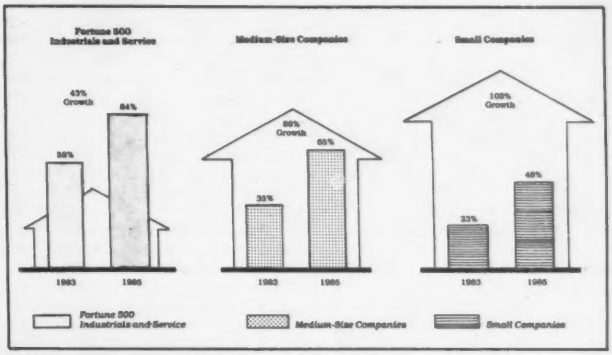
Ron Ward, principle analyst at Future Computing, attributes the poor showing of some portables to problems specific to those manufacturers.

Ward is skeptical about the oft-heard prediction that portables and desktops will become indistinguishable from each other. He is convinced the products will serve only as complements to a user's desktop machine. "The technology just hasn't come far enough to provide comparable functionality on those machines to a desktop," he said.

PLAN AHEAD

More than half the nation's largest corporations already have strategic office automation plans in place, according to a survey by the Omni Group, Ltd, a New York consulting firm. The survey, "The Office Automation Challenge: American Business Responds," also concluded that by 1985, 85% of Fortune 500 industrial and service companies would have formal OA strategies governing word processors, personal computers, electronic mail systems and other OA tools.

The Omni Group, with the support of 12 major OA vendors, interviewed 850 people with OA responsibilities in a range of small to large corporations. The Omni survey also revealed that OA has begun to "permeate" U.S.corporations, from the executive suite to the secretarial desk. The findings concluded, that though there is a wide variety of functions for new office equipment, "surprisingly consistent patterns of usage" have emerged.



OA Strategies: Their Status and Growth (Companies With Strategies)

Managers and professionals in large corporations use OA primarily for data analysis, which includes spreadsheets, projections and budgeting models. For the secretary, 94% of those surveyed pointed out that text processing was the most widely used application.

Surprisingly, the survey revealed that electronic communications is regarded as a key application by less than one-fifth of the large corporations and less than 10% in medium-sized and small companies.

Among the study's other key findings were the following:

- Despite the onslaught of personal computers, secretaries will continue to use dedicated word processors in the next two years.
- Local-area networks will "proliferate substantially" over the next two years.

OA NEWS

• OA planners are more interested in improving the effectiveness and speed of office transactions than in reducing staff.

• Corporations want to buy word processors and personal computers directly from computer vendors, not from retail stores.

For more information on the survey, contact The Omni Group, Suite 1460, 115 E. 57th St., New York, N.Y. 10022.

DO YOU TAKE THIS PBX VENDOR?

Though *People* magazine remains uninterested, hot romances between office automation vendors and PBX manufacturers are the latest trend. In the most recent marriage of convenience, Wang Laboratories, Inc. purchased 1.5 million shares (for $22.5 million) of Intecom, Inc., the Allen, Texas, PBX manufacturer. In the joint agreement, Wang will be allowed to purchase up to 5 million shares or 15% of Intecom during the rest of the year for not more than $66.5 million.

The Wang/Intecom deal follows a similar agreement announced last year in which IBM purchased 15% of Rolm Corp. Prior to and following the IBM/Rolm announcement, a long list of agreements was reached between such vendors as Digital Equipment Corp., Data General Corp., Honeywell, Inc., Hewlett-Packard Co. and the leading PBX makers such as AT&T Information Systems, Northern Telecom, NEC, Rolm, Intecom and Ericsson, Inc.

Unlike those deals, however, only IBM/Rolm and now the Wang/Intecom pact involved major stock purchases by the larger vendors. The significance of the recent deal will initially emerge in the development of an interface between Wang computer systems and Intecom's Integrated Business Exchange (IBX), considered by communications analysts as one of the top switches on the market. The agreement will allow Wang to redirect its in-house PBX development program and place more focus on advancing voice processing technology.

Though neither company would reveal specific plans, Wang and Intecom indicated they would jointly develop communications products that would allow for the full integration of Wang computers and associated peripherals with Intecom's IBX. Both companies also agreed the deal does not exclude either from entering into agreements with other PBX and computer vendors.

MIS + MBA = MONEY

A good management information systems manager is hard to find and IBM, for one, has decided to do something about it. The Armonk, N.Y.-based giant has initiated a $25-million grant program aimed at graduate schools of business in order to "strengthen instruction and research in the management of information systems."

IBM hopes to encourage further study in the MIS field by offering $12 million in cash grants to be shared over five years by 12 graduate schools. The schools, which will be chosen from among 500 nonprofit accredited university business programs, will be selected in the spring of 1985.

"Our aim is to encourage business and management schools to develop more graduates who clearly understand the role information systems will play in coming years," said IBM Chairman John R. Opel. "We hope the schools will achieve that goal by improving the quality of instruction and expanding course offerings and research in this field."

While IBM is trying to encourage more of a focus on MIS at business schools, some universities have already gotten the jump in that area. A few, such as Boston University, UCLA, University of Arizona and Dartmouth, have already established MIS programs within their graduate business schools. According to Christine Anderson, assistant director of the Master of Science in MIS program at Boston University, IBM's grant offering will have a major impact in providing seed money for business schools to start such programs. It will also bring invaluable computer equipment to many campuses.

In order to qualify for the IBM grants, schools must submit detailed proposals for development of faculty and courses of study in the management of information systems by Jan. 15, 1985. Initial planning grants ranging from $5,000 to $12,000 will be awarded this fall to 30 schools that submit the best preliminary proposals. Designed to defray costs incurred in preparing final proposals, these planning grants may be applied for by submitting a preliminary proposal outlining cost requirements and a development plan to the IBM University Relations Department, Armonk, N.Y., by July 13, 1984.

In addition to the grant money, IBM will give up to $1 million in IBM DP equipment (of the school's choice) as well as operating system and application software to each of the 12 institutions finally selected.

ONE SINGS, THE OTHER DOESN'T

Although the average salary for females in the computer industry fell further behind the average "all industry" salary in 1983, that news is not necessarily bad. According to Survey '83, the Women in Information Processing (WIP)'s annual computer salary survey, this downward trend is misinterpreted as a negative statistic. In fact, the falloff occurs when more females enter the field with their corresponding entry-level salaries and the overall average goes down.

The survey of more than 17,000 women (both WIP members and nonmembers) had both good and bad news for more than 200,000 female managers and professionals in the computer industry. Among the highlights: The average weighted salary in the industry increased 11% between 1982 and '83. Four job categories either broke or approached the $100,000 barrier — marketing representatives, marketing managers, information system directors and MIS/DP vice-presidents. Salaries of DP and MIS vice-presidents within large organizations jumped 22%.

Among the lowlights: The salary gap between female salaries and "all-industry" salaries persists, especially at the higher salary and higher experience levels.

The complete survey is available for $4 from WIP Survey, Lock Box 39173, Washington, D.C. 20016.

BRIEFS

NEW YORK — Microcomputer sales will surpass mainframe sales by the end of 1986 or possibly even this year, according to John Diebold, chairman and founder of The Diebold Group, Inc., of New York.

With this tidal wave of buying, micros have the potential to become the biggest factor in the computer industry, forcing major changes in vendors' strategies.

For more information contact The Diebold Group, Inc. 475 Park Ave. S., New York, N.Y. 10016.

WESTBORO, Mass. — Data General Corp. announced an agreement with AT&T to develop a communications interface to link DG products with AT&T PBXs.

The interface will enable DG's Comprehensive Electronic Office workstations and Desktop Generation systems to connect with Eclipse MV/Family systems through AT&T's Digital Multiplexer Interface, Dimension System 85.

CLEVELAND — Sales of office automation equipment expanded from less than $3 billion in 1972 to more than $15 billion by the early 1980s and the traditional business office shows no signs of easing up on the intake of OA tools, according to "Office of the Future," a report from Predicasts, Inc.

The total market for OA equipment will reach $25 billion by 1987 and over $37.5 billion by 1995, according to Predicasts.

The report is available for $1500 from Predicasts, Inc., 11001 Cedar Ave., Cleveland, Ohio, 44106.

WELLESLEY, Mass. — Imminent improvements in the voice communication and data handling capabilities of executive workstations will help drive workstation shipments to new levels, according to a report by Venture Development Corp.

The report said that data-only executive workstations — the most popular type sold last year — will not be the bestseller by 1990. The popularity of voice/data workstations will in part, be a result of its small desktop footprint, according to Venture Development.

The study, "U.S.Executive Workstations Market: 1983-1990," costs $2,950 from Venture Development Corp., One Washington St., Wellesley, Mass., 01281.

NORWALK, Conn. — Users of some electronic mail services could be spending as much as 250% more than they would be paying for the least expensive services, according to a survey by "Electronic Mail and Micro Systems," a newsletter published by International Resource Development, Inc. (IRD).

IRD said the wide price range illustrates the variety of marketing methods by vendors, but cautions that services should not be chosen on the basis of cost alone. A free copy of the survey is available from IRD, 30 High St., Norwalk, Conn., 06851.

FRAMINGHAM, Mass. — Market saturation, product maturation and product standardization in the OA equipment industry have caused sweeping changes in distribution patterns in the past year, according to an International Data Corp. (IDC) report.

IDC reports that five key office products areas have been affected: plain paper copiers, electronic typewriters, facsimile, PBXs and office systems. The 68-page report, "Channels in Distribution for Office Automation Equipment," is available for $1,200 from IDC, 5 Speen St., Framingham, Mass., 01701.

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OA Q&A

Irving Margol is executive vice-president of management services at Security Pacific National Bank in Los Angeles. Along with fellow vice-president Duwayne Petersen, Margol co-chairs Security Pacific's Office Automation Committee, which oversees the bank's extensive OA implementation. Security Pacific invested heavily in OA and is now putting together a strategic plan to oversee all aspects of implementation. A major consideration has been cost-justification, which Margol recently discussed with Computerworld OA.

What are the key issues surrounding cost-justification for Security Pacific?

For us, the major OA issue is whether a system is efficient and effective enough to improve productivity. We try very hard to involve the industrial engineers in looking at the situation from a productivity point of view. Then we have our financial analysis people take a look from a bottom-line point of view.

To determine the bottom line, we have the industrial engineering people look at a cost study. Those numbers are verified by the financial analysts, who report to our controller. If the system is definitely cost-justified, it's a matter of trying to get the expenditure in the budget. If you can't justify it, you save it for next year's budget.

How important is cost-justification for OA?

It's probably the paramount issue unless the item fits into a larger scheme of things. If it fits into a larger strategy, that may override some of the cost-justification.

Can you really measure productivity to offer cost-justification at all?

You can try. If you don't try, you do yourself more of a disservice. Sometimes what you want to do is there in black and white. It comes up in the bottom line.

But when a proposal is based on what you *think* will happen, even though you can't cost-justify it, you've got to be a good fighter for your project. That's the name of the game.

If you do take on that fight, you need a couple of allies. You need your own managers allied with you to say they really see a need for OA. You also need the DP people to sign off with you because it fits into the strategy, configuration and networking — to say the plan makes sense and it's compatible.

Where does the cost-justification pressure come from?

Top management. Up to now, that's been their background, a bottom-line mentality. We've asked executives, "When a request for a PC crosses your desk, how do you justify that expenditure?" The majority said, "I don't know enough about it to just sign it. I've got to do a couple of things. First of all, I've got to see some cost-justification studies. I've got to see who's requesting it and judge the confidence level I have in the man or woman requesting it. I want to see some input from the DP people.

Have you seen any OA programs stopped because of cost-justification?

Yes, we looked at a couple of things that have not turned out like we anticipated and we decided to abort the program. It doesn't always work that way though. Right now, we're using VMX' voice mailbox. Even though we've got more than 1,000 people on the system, I'm not sure they're the right people on and I'm not sure it's cost-justified. Nevertheless, we're willing to absorb that cost because we believe it fits into an overall strategy; eventually, through good training and getting the right people on the system, it will be cost-justified.

Is the whole issue of cost-justification for office productivity overblown? Will people just have to accept on faith that these tools are good for business?

I think the user has to be sold on OA. If the user is blindly sold, that's the way the user may manage OA. I happen to think that cost justification has a broader definition than just dollars and cents. It includes how you plan, how you organize and how you control and direct your work force. If you don't focus on these issues, you're back to the old idea of DP telling you what you need. OA

Coping With The Micro Invasion

By Glenn Rifkin and Jeffrey Cogen

As the microcomputer takes up permanent residence in corporations, it is increasingly clear to data processing and office automation managers that they need to devote more serious attention to this influx. It is also evident that most corporate buyers are playing it safe and not doing much shopping around when it comes to personal computer purchases.

In a recent *Computerworld OA* survey of 35 DP and information systems managers, fully 80% of the respondents had, not surprisingly, opted for the IBM Personal Computer as the preferred or single personal computer of choice for their organization. For the most part, the reasoning behind these decisions focused not on price or performance but — more important — on compatibility with the mainframe environment. "The choice was simple," said Kathleen Cook, vice-president of management information systems (MIS) for F.W. Woolworth, Inc. "Everything else we have is IBM."

While many organizations used other vendors' products (most notably those from Apple Computer, Inc.) scattered throughout departments, the survey respondents indicated many of those personal computers were bought prior to the creation of an organizational personal computer strategy. As

preferred-vendor lists become more prevalent, IBM remains the solid favorite, according to the survey results.

Also prominent in many respondents' buying decisions were IBM's popularity with software developers and Big Blue's strong service- and support reputation. "You might be able to save a few bucks on a non-IBM-compatible machine, but because of long-term software issues, you'd pay in the long run," said Robert Riggs, vice-president of information systems for Dresser Industries, Inc. in Dallas.

"You know that new product development will come from IBM and the PC will be the easiest to network," added Stephen Dale, vice-president of productivity services at the Bank of New England in Boston.

According to the survey, after IBM and Apple, the list of personal computers was varied. Among the more frequently named were the Hewlett-Packard Co. 150, Digital Equipment Corp.'s Rainbow, Wang Laboratories, Inc.'s Professional Computer, Tandy Corp.'s TRS 80 and the Compaq portable from Compaq Computer, Inc. The Compaq was often cited in conjunction with the IBM PC and was included for its portability and PC-compatibility.

Interestingly enough, the survey found most organizations have yet to make major commitments to personal computers, despite the overwhelming publicity the machines have generated, particularly in the past year. Of the Fortune 2000 organizations surveyed, 62% had fewer than 100 personal computers installed and, of that number, 69% had fewer than 20. Of 22 respondents willing to divulge spending, 64% had invested less than $100,000 in micros thus far. In addition, 75% of those surveyed had had personal computers for less than three years; 23% of those had just bought them within the past six months.

While some organizations are awaiting an expected shakeout in the industry, the majority said they realize the waiting game is over, and both a preferred vendor list and a formal personal computer strategy are becoming musts. Fifty-four percent of those surveyed have a preferred or single vendor list and have formulated personal computer strategies or are in the process of doing so.

"We are in the very early stages of a personal computer strategy," said Dick Goodspeed, director of information systems services for North American Van Lines, Inc. "It is being handled as part of our information center environment. We've been evaluating needs and making recommendations, but there has been no big growth in that area yet."

"We began to purchase them last year and formed a strategy to avoid a haphazard buying spree," the director of corporate data services for a large midwestern retail chain added.

Cost-justification procedures have put an end to haphazard buying in most organizations. Of those surveyed, 75% had cost-justification requirements for bringing in micros. Those requirements, however, varied all over the lot, from strict bottom-line savings to flexible soft-dollar justification.

For many, personal computers were justified simply by reducing time-sharing costs. Because putting a dollar figure on productivity is difficult at best, soft-dollar savings were more likely to be accepted by organizations.

"There is no tangible way to measure offsetting dollars. But you look for better people productivity instead," Goodspeed said. He pointed out that though he has initial sign-off responsibility on micro purchases, a specific request may get all the way to the president's office for approval.

At the Bank of New England in Boston, the purchaser must identify both soft-dollar benefits (the freeing up of time for greater focus on specific jobs) and hard-dollars savings (the cut in time sharing) and produce a plan for a one-year payback period. If the prospective user can justify a two-year value-added benefit, that is good enough for approval. According to Dale, "No one has been turned down yet."

For some, the strategy is straightforward. "We expect a one-year return on investment," stated Tim Hanrahan, manager of applications systems and programming for Sun-Diamond Growers of California in Stockton.

In other cases, the rules are less stringent. "The user must identify the application, but no specific payback period or increase in productivity is necessary for approval," according to Jack Shadle, director of MIS for Brown & Williamson Tobacco Corp. in Louisville, Ky. "Micros are so cheap that if they cut out any direct labor, they are justified," added Charles Bianco, director of DP for the Federal Home Loan Bank of Atlanta.

The survey also found that in some organizations, personal computers continue to be purchased to answer a specific need without a formalized set of guidelines. A fine line can also exist between strategic policy and a strict DP mandate, frequently a turnoff to end users.

At the Marriott Corp. in Washington, D.C., James R. Yoakum, vice-president of information services, set down procurement guidelines to provide "leadership and guidance. We've tried to provide leadership instead of control, and it has been very successful," he explained.

Cost-justification procedures have put an end to most haphazard buying. Of those surveyed, 75% had cost-justification requirements for micros. Those requirements, however, varied all over the lot, from strict bottom-line savings to flexible soft-dollar justification. Because putting a dollar figure on productivity is difficult at best, soft-dollar savings were more likely to be accepted by organizations.

Interestingly, organizational control of personal computers is as likely to be outside DP's bailiwick as within it. Of those organizations with formal personal computer strategies or policies, only 28% placed that control under DP. A number of organizations have opted for hybrid or ad hoc steering committees made up of DP managers, OA managers and division heads from key areas of the company to oversee the implementation of personal computers. In very large corporations, the responsibility for personal computers is often designated on the divisional level rather than corporatewide.

At the Philadelphia-based accounting firm of Laventhol & Horwath, the initial personal computer strategy was formulated by Allen Sneider, a partner, who is now on a national steering committee made up of corporate officers from various areas of the company along with the national director of DP.

Regardless of who controls the influx of personal computers, the tasks the machines tackle when they are inside the organization tend to be limited. In fact, 83% of those surveyed said spreadsheet analysis was the most prevalent application, and 65% used personal computers for word processing functions. Not surprisingly, the Number One software package in terms of popularity was Lotus Development Corp.'s 1-2-3. Such packages as Visicorp's Visicalc, Microsoft, Inc.'s Multiplan, Ashton-Tate's Dbase II and Micropro International Corp.'s Wordstar were often cited, but 1-2-3 was the runaway leader. In addition, 60% of respondents had developed software in-house for specific vertical functions such as tax auditing, maintenance tracking and field administration.

Because the planned entry of personal computers into organizations is a relatively recent phenomenon, the networking of those personal computers, in most cases, is still a future consideration.

Only 25% had tied micros together into any type of local-area networks, though 54% indicated they definitely or possibly planned to move in that direction in the near future. A more popular network configuration is the micro-to-mainframe link. Nearly 70% of the respondents have already established or are planning to establish links to the host in order to take some of the backlog off DP. For those that had already implemented networks, the process has generally been smooth, although some had experienced obstacles.

"We've had some problems matching user needs to equipment," the DP manager of a major investment house said. "It has also been difficult for users to readapt to the changing environment after the network is in."

"The network definitely changed user behavior," added Edward Otting, director of systems operations for Eli Lilly & Co. in Indianapolis. "The network makes it more of a microcosm of our data center, and users have had to take on added responsibilities."

End-user fears about computers would seem to justify extensive training programs, but the survey showed the opposite was true. Only 34% had in-house training centers, and some of those were part of already established information centers. Most organizations contacted had informal in-house training that ranged from week-long programs to self-teaching manuals.

As the numbers of micros increase, as was the case at a large New York brokerage house, the tendency is to switch from third-party or vendor-site training to formal in-house programs or centers.

The organization's business will generally determine the number of micros needed and how many people will have access to the machines. Most of those surveyed had fewer than 100 people with access to micros, although a few larger companies offered access to thousands of employees.

At Dresser Industries, buying decisions are made at 60 separate locations. Robert Riggs estimated that not more than 100 of the company's 45,000 employees had access to personal computers. "It's not for lack of support from the company. We encourage their use," Riggs said. "Those buying decisions are made by the independent division leaders."

Though they are still new to most organizations, personal computers have already begun to increase productivity, according to 54% of those surveyed.

"It used to take days to produce syndication forecasts. Now it can be done in a matter of hours in a single sitting. It takes away a lot of the drudgery," reported Sneider, of Laventhol & Horwath.

At North Pacific Lumber Co. in Portland, Ore., productivity statistics are being kept on personal computer use. According to Mits Tamura, vice-president of management services, the number of transactions per month has increased while staff size has remained the same.

Even though productivity increases tend to grow as corporations get more experienced with personal computer use, the new technology is not a panacea. Nearly half the respondents reported drawbacks with the sudden influx.

Common complaints included the hidden costs in both time and money for training and support; new security problems in terms of data as well as hardware; lack of standardization; and getting people to use the micros for the purposes for which they were purchased.

"Some people want the personal computers to do more than they are capable of, and they are frustrated by the limitations of basic language and disk space," explained Leann Smith, a systems engineer at Uniroyal's Textile Administration Center in Winnsboro, S.C. "Others are playing with the personal computers, trying to program when they are not programmers. They are wasting time and there is no payback."

Hanrahan of Sun-Diamond Growers echoed those sentiments. "Many people are asking for custom programming packages and that just adds to the DP backlog," he said.

And there is the oft-heard lament, "The vendors just don't have their act together," according to a DP manager of a midwestern retail chain.

Ironically, when it comes to service and support, the vendors do seem to have their act together. Of those responding, 89% reported no trouble with service and support, although several pointed out that in-house departments had taken over responsibility for personal computers in that area.

The survey also revealed a not-too-surprising lack of personal computers on executives' desks, with only 37% of the respondents reporting executive use.

There is little doubt the personal computer will become a major information tool over the next five years, the survey results show.

Asked what they would like to see develop over that period, respondents tended to agree that the key item on the wish list is standardization. Other frequently mentioned items were easier micro-to-mainframe links, better communications tools, friendlier user interfaces, hardware-independent software, a standard operating system and a local-area network offering.

"I'd like to see software running on all hardware so that you don't have to throw away your personal computers if a good package is developed for a different machine," stated Charles Bianco of the Federal Home Loan Bank. "I'd also like to see DP managers take a more active role. Many aren't interested in office automation and they are not listening to their staffs about how personal computers can be used for OA. In the long run, they'll learn the hard way." OA

Rifkin is a senior writer and Cogen is an editorial intern for Computerworld OA.

OA IN EUROPE: SLIGHTLY BEHIND THE TIMES

BY ANN DOOLEY

Trailing several years behind the U.S. in office automation, Europe's particular brand of OA is being formed by an uneasy mixture of U.S. technology and European culture.

Many of the problems that Europeans face in automating their offices are strikingly familiar to those encountered by their American counterparts — fears of incompatible equipment, end-user resistance, cost-justification dilemmas and strategic planning difficulties.

Other problems are not so familiar and are indicative of the differences between the entrepreneurial spirit in the U.S. and the more conservative traditions of Europe.

These differences vary from country to country. In general, however, they amount to cultural biases against automation, government regulatory restrictions and worker councils that exercise strict control over any actions that affect employees' work and their work environment.

It is generally believed that most of Western Europe is three to five years behind the U.S. in OA. Most major businesses are in the word processing stage and are just entering the planning and pilot project stage necessary for more sophisticated systems. Quite frequently, the demand for electronic typewriters outpaces the demand for WP. Of the 10 million secretaries in Europe in 1983, only one million used an electronic typewriter and only 150,000 used a word processor.

What's more, out of 20 million clerical workers, only one million had access to a CRT terminal, according to a study recently done by the London-based firm, Wharton Consulting.

One technological problem holding European users back in OA is the translation time lag that can occur between a product's first introduction in the U.S. and the time when it becomes available to the European community. The delay, sometimes as much as a year, is

GLENN RIPON PHOTO

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often the result of being required to rewrite a package completely rather than just make a direct translation. English can frequently be used, but text must also be available in a variety of native languages and developing that language character data set takes time. Even English may vary; for instance, the data dictionaries between the U.S. and the U.K. are very different. Other problems also crop up. Sometimes numerous incorrect translations are produced, or firms may wait to be sure a package is successful before translating it; either prolongs the lag time.

Although no easy answers exist, one solution might be to structure software so that one generic product is developed, thus creating easier and quicker translations, according to Dr. P. Hartley Millar, of Diebold Europe S.A.

Europeans are reportedly less experimental and entrepreneurial than Americans and more suspicious of technological change. The more formal and traditional attitudes obstruct the information sharing that occurs through OA.

Despite the time lag, however, a large amount of OA technology is available in Europe. The crowded aisles and swelling number of vendors exhibiting at the recent Hannover Faire in Germany clearly showed that OA and personal computers are growing areas of interest for users. Although the interest is on the upswing, Europeans are still hesitant to adopt the technology. They express many of the same doubts as U.S. businesses, and the reluctance is apparently more deeply engrained. Not as experimental or entrepreneurial as Americans, Europeans are reportedly more suspicious of technological change. The more formal and traditional attitudes that exist in European offices obstruct the information sharing that occurs through OA. Studies have shown that secretaries are not so resistant to the technology as are their managers and executives, who see it as a loss of status.

The U.K. appears more open to automating offices than any other European country. A survey for Digital Equipment Corp., Europe, prepared by HR&H Marketing Research Ltd. studied computer attitudes among several countries. In the U.K., computers were regarded with enthusiasm or complacency, and respondents showed optimism for the future. The positive answers were based largely on respondents' familiarity with computers. In France, more wariness was displayed, and the perceived disadvantages of automation assumed more importance than in the U.K. People were, however, optimistic about the increased quality of work life in the future.

In Germany, much more concern was evident. While computers were regarded as necessary, they were also viewed with apprehension and pessimism for the future.

In Sweden, those familiar with computers were enthusiastic; others were indifferent, although most regarded their future use optimistically.

In regard to unemployment from automation, the differences again changed from country to country. In the U.K., the effect of automation on job loss was not considered a major problem. In France, job losses were thought to be one short-term effect of automation, and respondents were optimistic for the future as new jobs were created.

In Germany, however, the picture changed. Computers were blamed for job losses. German respondents felt this presented real problems and felt personally involved. Swedish respondents also believed computers caused job problems, but to a lesser degree than did the Germans.

The U.K. appears to be following the U.S. example, not the European one. The differences have been accentuated in the last few years because European countries haven't deregulated and the U.S. has been increasingly liberal in that regard. Prime Minister Thatcher also has opened up commerce for U.S. and Canadian businesses, but not for European ones, according to Robert de Bruin, vice-president of HHCC in France.

Public opinion is not the only problem encountered in spreading the use of OA. Government regulations are much stricter than in the U.S. One of the major influencing factors is the nationalized communication services of European countries. The Postal Telephone and Telegraph, more commonly referred to as PTTs, are

monopolies that, according to some critics, create heavy regulations and high service rates. Private companies aren't allowed to compete with PTTs, resulting in more standardized communications interfaces; at the same time, these interfaces may not be easy to use or cost-competitive.

Governments may also require that companies buy indigenous equipment from businesses in their own country, or at least allot a percentage of their total expenditure to them. Government attitude is often influenced by whether a multinational vendor has a manufacturing site in that country.

A third major difference between the U.S. and Europe is the power of unions and worker groups. In Germany, for example, worker councils can stop a project in a business if they feel it will adversely affect employees. They are consulted on every major project and are an instrumental part of the decision-making process.

Worker councils concern themselves heavily with ergonomics. Northern European countries rank this as a primary concern, even more important than device functionality or cost. OA takes on a more human aspect in Europe. Some of the major concerns expressed are changes in work, physical effects encountered and job reduction.

The worker councils recently have begun to look more favorably on automation, however, as they would look toward anything that would help bring them out of the recession Europe has been a victim of in recent years, according to R. Malcolm Jolly, director of Diebold Research Program, Europe. The worker groups realize they will lose out in the international market if they don't stay competitive, Dieter Basziszta, of Wang Deutschland, agreed. The whole human aspect differs greatly from the U.S., where ergonomics are of less concern and the attitude is more one of "if it works, it works." Werner Reinkendorf, of Zenith Data Systems Corp., said. "When it comes to ergonomics, the U.S. can learn from us," Diebold's Jolly added." The U.S. can supply products, and we'll supply the ergonomics information."

Although slow to arrive, market predictions affirm that change will be coming to Western Europe. The market predictions are high and a strong growth spurt is expected. The overall market will reach $30 billion in the next few years, predicted Jean-Claude Peterschmitt, vice-president, Europe, for Digital Equipment Corp. The European market for private videotext is expected to reach $1.5 billion by 1988, and the market will reach $5 billion by 1993, according to Butler Cox and Partners, U.K consultants. Videotext has been pushed by the U.K., France and Germany for the last several years, although the use of videotext is now being emphasized more for business use than the home. U.K.'s Prestel system, for example, is due for review in a year and is expected to undergo dramatic transformation from a private users' club to a public network, according to Jorgen Herlevsen, DEC's European commercial marketing director.

Germany's videotext system has also had problems. IBM presented a low bid of $20 million in 1981 to Bundesport, the German telephone authority, to build the Bildschirmtext system. Although expected to be nationwide this summer, it is nine months behind schedule and the delays reportedly threaten to double its cost.

The European market for multifunction word and data processing terminals will grow nearly 75% through 1986, reaching 561 million units by year-end 1986. Shipment value is expected to reach $1.5 billion, according to a survey by Frost & Sullivan, Inc. The predictions, however, are subject to the variations in the European economic climate, regulatory controls over data transmission systems and uncertain levels of government support for systems development, the research firm cautioned.

Another Frost & Sullivan survey predicts that the market for management workstations — advanced and telephone-based — is projected to be at about $10 billion and $600 million respectively by the end of the decade. Shipments are expected to grow by at least 80% yearly in both markets. The market for office software in Europe is forecast to reach over $5 billion by 1990. Market trends show that Germany is the largest WP market, followed by the U.K.

European OA users are very similar to those in the U.S. A high concentration exists in banking, finance and insurance, followed by manufacturing and wholesale/retail, according to DEC's Peterschmitt. Some user groups are even more advanced than many of their counterparts in the U.S., according to Herlevsen. Banking is such a case, the DEC executive pointed out, because European banks have to contend with currency exchange. Because of transborder issues and languages, insurance is another case. In many cases, automation is more sophisticated outside of a company than within it, he noted. In most installations there as here, it is the MIS person who is spearheading OA, although user departments frequently are in charge when the system is on a stand-alone basis.

One area in which the European community may outshine the U.S. is in communications. Standardization is more advanced in Europe because of the PTT's monopoly. Only one standard is available, and bypass companies don't exist to provide competition. "At least half the computer market is in the U.S. and half of the telecommunications market is in Europe," de Bruin commented. Public networks exist more often in Europe as do private networks in the U.S., he noted.

In keeping with this philosophy, videotext is of more interest in Europe than microcomputers, which, although accelerating, are still two to three years behind the U.S., according to Wang's Basziszta. Public networks like Germany's BTX are growing faster than private networks like microcomputers, de Bruin stated. U.S. vendors will begin to introduce teletext systems with their computers and the move to videotext will eventually come to the U.S., he predicted. He also suggested the existence of the public networks is one reason electronic mail, for instance, is not more widely used.

The European communications industry is not without its problems, however. Modems must undergo a sometimes slow and difficult approval process as part of a public network, and transnational data flow is of ongoing concern. The European 12, a committee of 12 West European vendors, are attempting to develop a set of international standards in order to avoid being locked into a single user. They hope thereby to encourage competition among the various countries and their indigenous vendors.

U.S. vendors from Lotus Development Corp. to AT&T are hoping to crack the European market. It is speculated that one reason AT&T recently bought 25% of Olivetti and Co., the Italian office manufacturer, was to have an entry into the European market. It is also rumored that AT&T is looking for other European expansion properties. A number of strong European vendors are in the hardware market and the number of software companies is growing, according to Werner Reinkendorf, Zenith Data Systems, Germany. Some of the major micro vendors are IBM, Apple Computers, Inc., Victor Business Products, Commodore Business Machines, Inc., NCR Corp. and Olivetti.

IBM claimed nearly one third of the European computer market last year with Bull, the French computer company second with 5%, according to International Data Corp. IBM is expected to be the front-runner in the personal computer market this year, (23% share of units shipped) ahead of last year's winner Apple. Apple took a 21% share of the 1983 market, followed by Commodore with 18% and IBM with 16%. IBM is a strong contender all over, but smaller companies have the advantage that they can respond faster than IBM. They are also more flexible, have less respect for the traditional regulations and won't take no for an answer, de Bruin maintained.

The OA situation in Europe will change slowly, but experts feel assured that technology will win out. Although microcomputers have not made the impact in Europe that they have in the U.S., they are making companies think about technologies beyond word processing. Better training and education are needed for decision makers to end the confusion about OA which is making them reluctant to automate.

"OA takes a lot more handholding than was first realized simply because people aren't ready for it yet," DEC's Herlevsen said. When a certain level of sophistication is reached, other applications will be easier to implement, Jolly, the Diebold director, agreed.

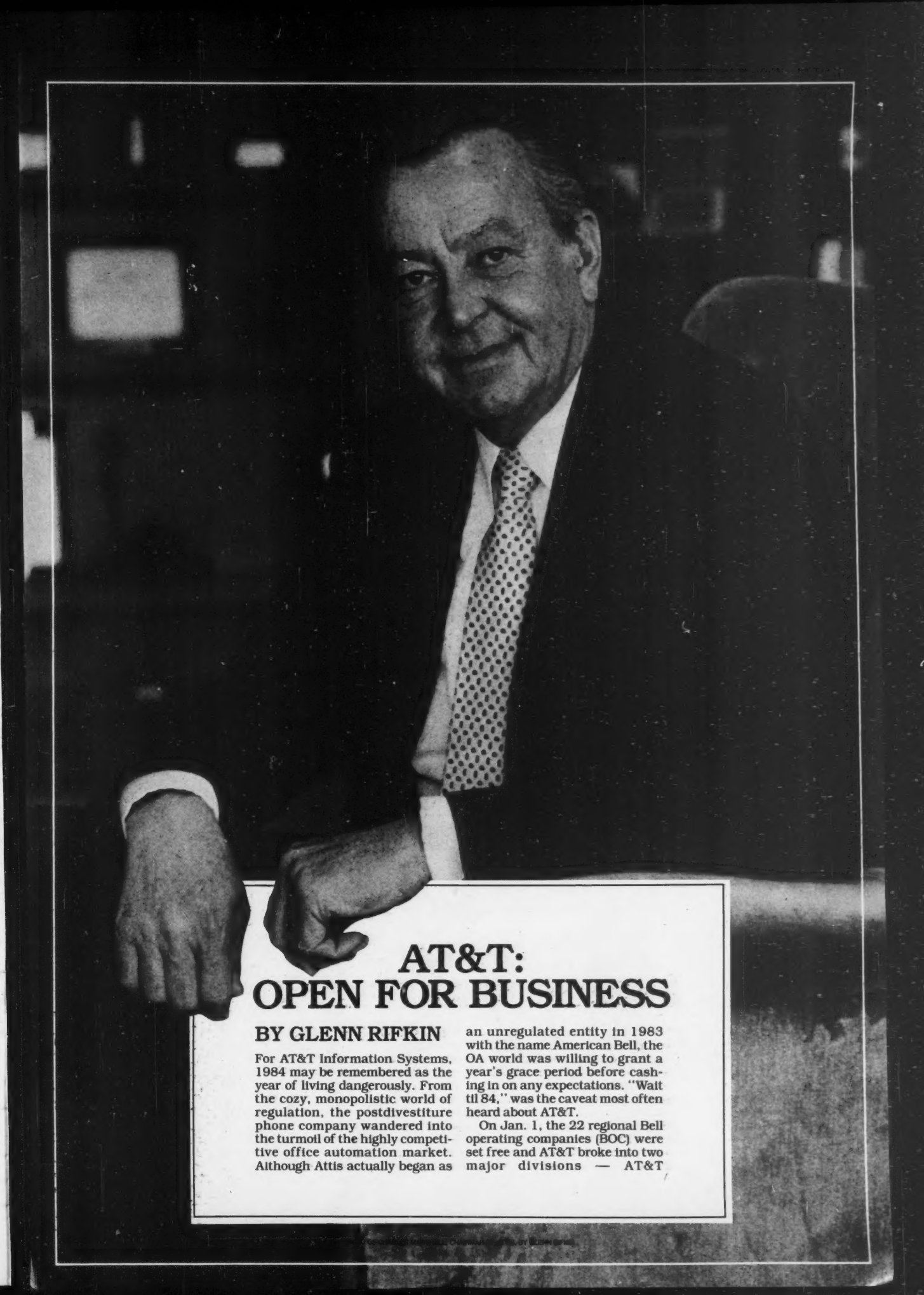
Cost-justification is one of the biggest organizational stumbling blocks for the more economically strapped and conservative Europeans. In fact, only the more industrialized European countries will be heading into OA anytime soon. Others may have the need for the productivity gains, but are not advanced enough in the general computer areas to take the step into end-user computing.

Many Western European countries are developing a new awareness of high technology and subsidizing and encouraging OA, according to Wang's Basziszta. A German government-sponsored program of tax rebates and training, for example, resulted in a 35% to 40% growth rate in technology last year; a similar rate is expected this year. The Germans are becoming aware that if they hope to compete in an international market, they must keep up with the fast-moving technology. The younger users who are entering management are helping to effect these changes, according to Prof. Dr. Arnold Picot from Germany's University of Hannover.

The European OA market is slowly forming and will experience many of the growing pains being experienced in the U.S. The Europeans' OA system will not be an exact clone of the U.S system, however; it will be a product of its own needs. OA

The OA situation in Europe will change slowly, but experts believe the technology will win out. Better training and education are needed to end the confusion that makes decision makers reluctant to automate.

Dooley is editor of Computerworld OA.



AT&T: OPEN FOR BUSINESS

BY GLENN RIFKIN

For AT&T Information Systems, 1984 may be remembered as the year of living dangerously. From the cozy, monopolistic world of regulation, the postdivestiture phone company wandered into the turmoil of the highly competitive office automation market. Although Attis actually began as an unregulated entity in 1983 with the name American Bell, the OA world was willing to grant a year's grace period before cashing in on any expectations. "Wait til 84," was the caveat most often heard about AT&T.

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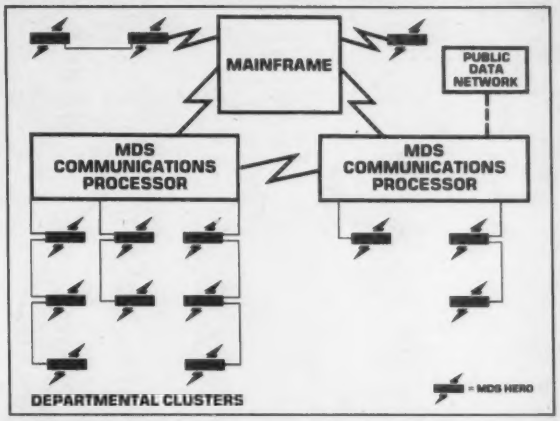

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Communications and AT&T Technologies. AT&T Information Systems (Attis), a wholly owned subsidiary of AT&T Technologies, began its assault on the office market.

As 1984 nears the halfway mark, AT&T has demonstrated that it plans to fulfill the promises of '83. It has become apparent, however, that no single vendor, even one as powerful as AT&T, can become a major force overnight. It may be several years, industry analysts agreed, before AT&T assumes its position as a mighty OA power.

Attis is not dismayed, however. The move into the office market was expected when divestiture became an inevitability, and Attis has entered the fray with resources others can only dream of. Though pundits have called it a "107-year old startup" Attis is anything but a neophyte in most crucial components of the business. When industry watchers talk numbers, they expect nothing less from Attis than a head-on battle with IBM.

When and if this clash will take place remains uncertain. For Attis, the current dilemma is to chart a smooth course into OA waters in several critical areas — product development and manufacturing, marketing and sales and service and support.

The entry into any new market can be fraught with expected and unexpected pitfalls, but Attis is surging forward, a great moving mass that will be difficult to halt. Charles Marshall, chairman of Attis, said, "I respect a number of people in that marketplace. I don't fear a single one of them."

With 98,000 employees, access to AT&T's $56 billion in revenues, the resources of the prestigious Bell Laboratories and an established presence in virtually every office in the country via its communications technology, Attis seems to merit Marshall's confidence.

By all indications, the company has started off in the right direction. In 1983, under the name American Bell — later changed to Attis when Judge Harold Greene ruled that the name Bell could not be used — the company announced 35 new products. Among them was the powerful System 85 private branch exchange (PBX) and the low-end Merlin PBX. In 1984, with the addition of the 60,000-member service division (which had been part of the BOC), Attis started rolling out even more ambitious announcements.

Attis made it clear it would look outside as well as internally for product development. In January, it announced it had purchased 25% of Olivetti Co., the Italian office products company. On the heels of that news came word of a deal with Convergent Technologies, Inc., the Santa Clara, Calif. workstation manufacturer.

In March, AT&T unveiled its first internally developed, commercial computer offering, the Unix-based 3B series of minis, superminis and supermicros. In late April, the System 75 PBX, a mid-range 50-line to 400-line offering, was unveiled in order to complement the company's Merlin and System 85 PBXs. And there are no signs of letup. "I hope our customers enjoy their summer as much as we're going to, because we intend to have some announcements that will make their summer more exciting," Marshall said.

Among the expected revelations is an AT&T personal computer. Although an internally developed personal computer may soon be announced, many industry experts believe the personal computer offering (reportedly for less than $3,000) will be the fruit of the Olivetti connection. The betting is

that AT&T will market Olivetti's IBM PC-compatible M24 desktop and M21 portable models in this country while Olivetti offers them in Europe. Rumors of discussions with Apple Computer, Inc. also persist. As Amy Wohl, president of Advanced Office Concepts Corp. put it, "Any PC vendor would sell his soul to be AT&T's supplier."

Also on the horizon is the advanced workstation from Convergent, quite possibly based on Convergent's upcoming N-Gen offering, along with the expected marketing of a version of Convergent's Workslate portable computer. Several internally developed products are said to be on the way as well, but Attis would not comment on them.

In addition, Attis is expected to introduce a local-area network to go along with the Ethernet-based network unveiled in March. "Before we're done, we're going to announce several types of local-area nets to suit our customers' needs," stated Frank Vigilante, president of Attis' product and development division.

In fact, in terms of product offerings, Attis wants it all. "We're going across the board," Vigilante said. "Our customers want a lot of things from us and we're going to give them what they want."

Of course, vendor promises are as ubiquitous as customer headaches and, as massive as it is, AT&T has yet to establish a presence in the OA market. Though most consultants agree Attis is a force to be reckoned with, not everyone is convinced.

"I'm very uncertain about it," said Michael Hammer, president of Hammer & Assoc., a Cambridge, Mass. consulting firm. "I have to classify it as a dark horse. A lot of the conventional wisdom about AT&T is not germane. The conventional wisdom, for example, that Bell Labs is a spectacular product development organization — it's not true. Bell Labs is a very good research organization that develops very good technology. But it's had very little cause to be sensitive to markets, which is what you need in product development. Bell Labs is really good at developing new technologies, but not necessarily at understanding how they relate to the marketplace."

Kim Myhre, manager of communications industry research at International Data Corp. (IDC), added that AT&T, with its large and profitable presence in the long haul telephone business, may be able to support an OA thrust even if it were not profitable. "AT&T doesn't have a full product line and it almost doesn't need it. It can dump a lot of products out there and see what people will buy," he said.

While most consultants concede that AT&T knows its stuff when it comes to communications, they are taking a "wait and see" attitude toward the company's computer capabilities. The recently introduced 3B line was developed and incorporated internally at AT&T years ago. The computers are said to compare favorably in terms of functionality to similar machines from Digital Equipment Corp., Data General Corp. and IBM. But analysts are not particularly impressed with pricing (one consultant indicated the line was 25% overpriced in the market) and the machines are currently available only through value-added resellers and OEMs.

"There is no clear reason to go to AT&T now. It hasn't delivered any product and it has no track record in the market. Customers have been burned too many times on vendor promises," said Glenn Keitel, president of Office Automation Consultants, Inc. of Minneapolis.

"Our end-user clients assume AT&T will be a

major vendor in this market, and we think that's true," Wohl said. "But there are some major questions." According to Wohl, the jury is still out as to how long it will take before the announced products can be delivered. The Convergent Technologies deal, for example, has reportedly run into snags due to chip delays.

Wohl also questioned how long it would be before the products being developed internally could be brought out in quantity. To what extent will AT&T encourage software developers to get software written for the products? And, most important, how long will it take for AT&T to get organized enough to be creditable in an extremely competitive market?

Although there has been a murmuring that AT&T is, in fact, too late to get into the market, Attis' Marshall disagreed. "It's never too late to enter a good market. It's a very big marketplace and there's room for a number of quality vendors. We have the staying power and the team to be one of the survivors."

In general, the industry agrees. "If you are a big enough company, it's really hard for the window to close. On the other hand, I don't expect the company to be successfully active for another 18 to 24 months," Wohl said.

One area in which AT&T has been successfully active (without even trying until recently) has been in the development of the Unix operating system. Unix was created internally in the late 1960s as a helpful tool for programmers, and AT&T licensed but never actively promoted it. Nevertheless, the operating system has steadily gained industry supporters from among former college students who used it almost exclusively during their academic days. Unix currently has gained such popularity as an operating system for the office that virtually every major vendor, including IBM, DEC, Wang and others, have made commitments to it.

Through its Computer Systems Division, AT&T has now begun to actively market Unix System Five. It is counting on that offering to become not only an industry standard, but to serve as an entry into the office market for Attis.

"We think Unix is one of the keys," Marshall stated. "It's a very fine operating system for the computer age and we would like to see a number of applications develop for it. We intend to push it very hard."

While Unix' success seems virtually assured, its viability as an entry into the office is not. Hammer pointed out that though people look at Unix as a "great strategic resource" for AT&T, it isn't clear to him how the company can parlay an operating system into an advantage in selling equipment.

"It's too easy to make a plug-compatible version of an operating system. So I don't see that as an enormous resource," Hammer commented. Einar Stefferud, president of Network Management Associates, Inc., in Huntington Beach, Calif., added that Unix had greater potential for AT&T when the operating system was "vendor independent." In trying to make System 5 an industry standard, AT&T is "beginning to jerk Unix around for market position. That will hurt Unix, not help it," Stefferud stated.

Though AT&T obviously disagrees with that assessment, the company understands the need to go beyond Unix. According to Vigilante, Unix will be just one Attis offering. "We plan to be the Number One Unix vendor, but we're not going to stand around Unix and expect to conquer the world with it. Our customers have big commitments to PC-DOS and to SNA, and we have to work with those."

Vigilante pointed to the fact that Attis is committed to an open architecture and has already announced agreements with other vendors like Wang, Hewlett Packard Co., Honeywell, Inc. and Data General for document interchange and data interfaces. Although he would not specify when SNA or PC-DOS compatibility would be available, he did promise that both were on the horizon.

In fact, Attis has created the Information Systems Architecture (ISA), which encompasses an integrated product family, communications-based OA, both local and inter-cluster networking, along with the open architecture. Supporting ISA are Attis' vast marketing and service organizations.

This Attis "team" is made up of three divisions — product development and research, marketing and sales and service and support — which are working closely with each other as the company attempts a coordinated entrance into the new market.

The marketing and sales division, headed by Robert Casale, has a staff of 12,500 who work out of 130 branch offices. Coming from a monopolistic environment, the marketing group has been singled out as "the Achilles' heel" of the organization. According to Wohl, marketing will be the trickiest part for AT&T, simply because the managing of a competitive sales force is something new and different for the company.

Casale admitted the transition from a monopoly to a competitive environment is "an incredibly demanding challenge." But he expressed confidence in the progress that had already been made and pointed out that the company had begun heading in this direction several years ago. Along with serious retraining, AT&T began recruiting "hard-seasoned" marketing professionals as well as newcomers interested in this environment.

According to Wohl, however, many people that AT&T had hired have left. "We have seen in the industry a remarkable number of people who, for a period of six months to two years, have gone to work for AT&T to help gear up for their OA marketing programs. But they have not stayed." Part of the problem was timing, she said. Many were hired too soon, relative to when "the action" started.

Casale contended the market is "a new world, but not a foreign world. When you are talking about selling systems and solving business problems with customers interested in integrated systems and applications, that is executed very much in the kind of environment in which our people have been selling large PBXs. Those elements are the same whether the customer is procuring a data product or a voice product."

For Vigilante's product development group — a 4,000-person team culled from Bell Labs and the former Western Electric — the transition from a regulated environment was also the major obstacle. Vigilante admitted that two years ago, his group could have been accused of being behind technologically, but that now, just the opposite is emerging. He pointed to the success the company has had with both the System 85 and the Merlin. "I call the Merlin our Cabbage Patch Doll. We sell everything we make. Everybody wants one, and we don't have enough right now."

The System 85 Release 2, designed to compete with the Centrex system being offered by the BOCs, is also selling so well that Attis has already sold its complete allotment for 1984, Vigilante claimed. He expressed concern over the company's manufacturing capabilities and said that, while the development group has many new products in hand, the ability to deliver those products will directly affect how many new offerings Attis will announce this year.

The System 75, the newest offering targeted to the mid-range PBX user, is designed to fight off some of the stiff competition Attis faces from the likes of Northern Telecom, Inc., Rolm Corp. and NEC Informations Systems, Inc. According to Vigilante, Attis has already won several competitive bids with the product. A single-cabinet switch capable of supporting up to 400 lines, System 75 won't be available in quantity until the fourth quarter or even later, he added.

Backing up Casale and Vigilante is Bruce Schwartz' service and support division. This 60,000-person force joined Attis six months ago and is already experiencing the pains of transition. Intending to match its work force to its current needs, most of that group has been offered voluntary retirement in an effort to cut the work force to a more efficient level. The move is reportedly necessary because of a drop in market share in the phone equipment business. In fact, AT&T Chairman Charles Brown announced in April that the company does not expect to reach its 1984 profit goal.

An Attis spokesman denied that any layoffs would occur if the voluntary retirement plan is unsuccessful. He insisted that there was no target number of retirees sought after and that this was just a continuation of the program offered to the rest of Attis employees last fall.

In joining Attis, the service group redesigned its operation into a single national organization. The division dissolved its 1,500 service locations into 17 regional centers and has assigned specific technicians to specific accounts rather than the random relationships of the past.

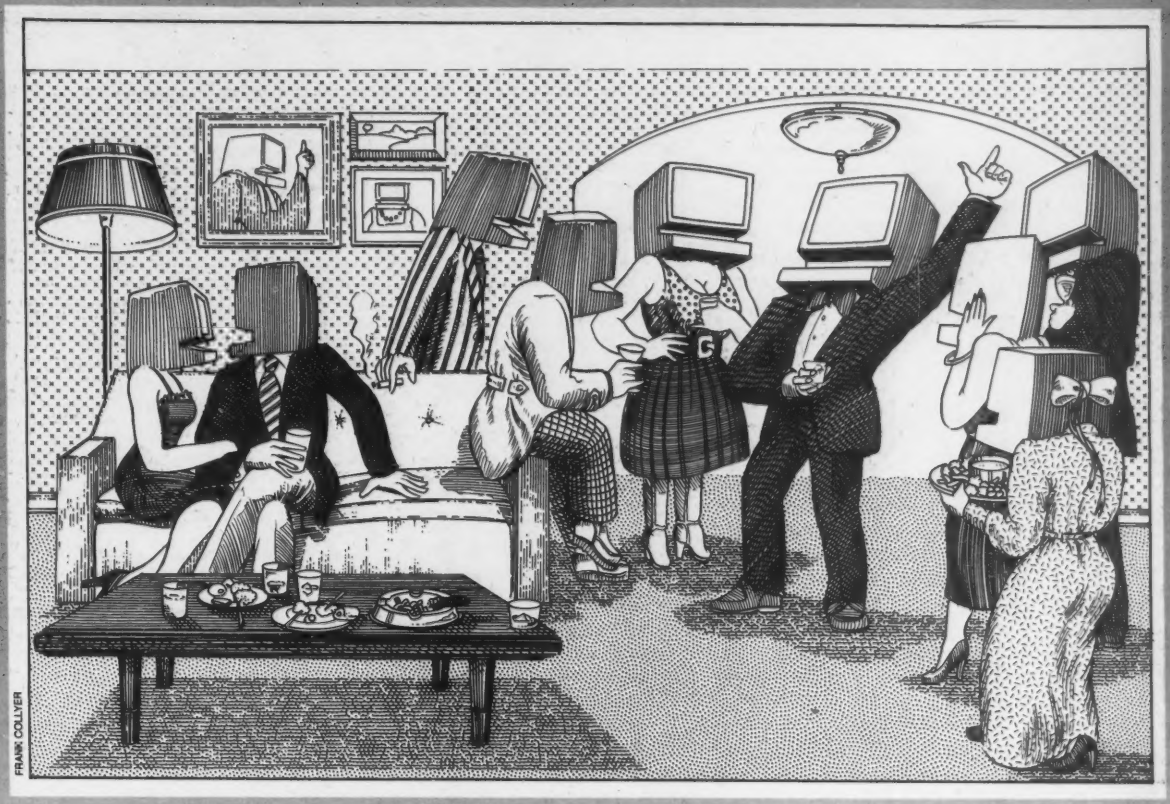
The division has also stepped up technician training, with a reported 1.8 million training hours in 1984.

With its vast resources of people and money, AT&T "will do whatever it needs to to be successful," said Casale. The company, though unwilling to reveal market share goals, expects to be "among the leaders," according to Marshall. "I don't think you ought to be in a marketplace where you are Number Four or Five."

Whether AT&T eventually confronts IBM in the OA market will probably not be determined soon. Marshall, pleased to be compared to IBM, conceded, "Sure, there'll be some collisions. We've been competing with IBM in data terminals for a long time, but we were competing with our hands tied. Now we can go into this business as broadly as we should and, though I don't think they're afraid of us, I know we're not afraid of them." OA

Rifkin is senior writer for Computerworld OA.

Two years ago, his group could have been accused of being technologically behind, Vigilante said, but now, just the opposite is emerging, with the success of both the System 85 and the Merlin. 'I call the Merlin our Cabbage Patch doll. We sell everything we make. Everybody wants one, and we don't have enough right now.'



MICROS JOIN THE 3270 PARTY

BY DENNIS A. BLAHUT

In 1971, IBM announced the 3270 information display system to fill the need for a real-time interactive communications terminal system. This terminal system has become the most popular interactive display terminal system IBM ever developed for the distributed processing marketplace.

In fact, a measure of its popularity is that "3270" has become a generic term; some networks utilize a 3270-type protocol without a single piece of IBM gear within the network. Simply stated, the 3270 is a stand-alone or clustered controller system supporting CRT terminals and printers with interactive access to computation facilities and data bases on larger computer systems attached either locally or remotely via telecommunications links.

The success of the IBM 3270 information display systems spawned a host of "me, too" competitors that offered plug-compatible 3270 controllers and/or terminals and printers. Nonstandard features were big sellers; most users wanted to maintain strict compatibility with IBM's product.

In the 1970s, the microcomputer brought a dramatic increase in the use of small computer systems and distributed data processing networks. Intelligent terminals and micro systems were distributed throughout company environments; user departments became more sophisticated and grew accustomed to the availability of local intelligence, programming capabilities and data storage.

It became evident, however, that these systems required access to the information resource stored on a central data base. Maintaining a separate, nonintelligent 3270 inquiry system or transaction-based system in addition to a microcomputer system gave way as the two concepts were merged by providing software emulation of the 3270 controller and its associated devices.

Early implementation of 3270 software emulation on microcomputer systems was a strict plug-compatible emulation of existing features. It did not offer any value-added capability to the use of 3270 interactive inquiry or transaction processing.

The inherent disadvantage of this approach is that when the microcomputer system is put in a 3270-emulation mode, the power available within the micro is in large part wasted by the emulation of a hard-wired device.

In response to this problem, a new form of 3270 software emulation appeared in the 1980s. This approach combines the availability of software support for 3270s on most of the major mainframes with the power of local programmability within the microcomputer system. This approach is known as the intelligent 3270

capability and is an application software interface to 3270 communications.

A standard 3270 is really just a send/receive data buffer, which receives data from a keyboard for transmission to the network and receives data from the network for output to a CRT screen or printer.

In contrast, the intelligent 3270 capability features the addition of an application program between the user of the terminal and the network. The application program interfaces 3270 communications on a network, a data buffer or buffers within the microcomputer system, local I/O devices and the operator through the keyboard and CRT display.

A standard 3270 is just a send/receive data buffer that receives data from a keyboard for transmission to the network and data from the network for output to a CRT screen or printer.

In essence, hooks are provided in the software to interpose cost-, time- and work-saving program logic between the terminal operator and the network. This article will examine some of the ways this capability can be used with a 3270 network.

Local Format Storage: One of the earliest uses of the intelligent 3270 capability is local format storage — local storage within the micro system of screen masks normally sent from the host to the terminal system.

By storing formats locally, the micro system typically will have fewer transactions with the host. It can display screen masks faster and reduce the amount of traffic on the line between the terminal system and the host by sending only variable data in both directions.

Formats stored locally on the micro system allow mainframe resources, in terms of storage and the programming necessary to send formats to the terminal system, also to be saved. This is not typically a popular use of replacing nonintelligent 3270 terminals with intelligent 3270 terminals, because the applications on the host are designed to send the formats.

In new applications, however, mainframe and terminal programming can take advantage of this very cost-effective feature.

Backup Operation: Another advantage of the intelligent 3270 capability is in backup operation. In conjunction with the storage of local formats — or even with using either formats down-loaded from the host during on-line operation or local formats during off-line operation — the intelligent 3270 terminal system provides a continuously operating system.

During host downtime or communications outages, users can switch into local mode and process transactions locally using the same screen formats presented during on-line operation. Rather than route the inquiries to the host, an intelligent 3270 capability will store them locally.

If data is being entered, it will be stored locally; when communication is reestablished with the host, the intelligent 3270 system can automatically present the transactions to the network as if they were being keyed by the operator.

Furthermore, an intelligent 3270 system can be programmed to monitor communications with the host. During an on-line operation, the intelligent

3270 system can sense that communications with the host have been lost. It can then alert the user or go into backup operation automatically.

During backup, the intelligent 3270 system can continue to attempt to establish communications with the host while the user continues to do transactions.

When communications have been successfully reestablished with the host, the system can alert the operator and either request that the operator put the system back into an on-line operation or automatically revert to on-line operation.

Editing and Validation: As users enter data under an intelligent 3270 system, the data can be edited to see that it conforms to a variety of legitimate values. For example, checks normally associated with key-to-disk systems can be utilized in an intelligent 3270 environment for fundamental validations such as "valid value-range" and "must fill in each individual field."

Before the data are submitted to the host, more sophisticated data checking can also be implemented, such as cross checks on different fields being entered on the form, check digit calculations or verification, fee generation, numerical calculations, table lookup and ID code validation.

Using intelligent 3270 systems to enter new information to be stored at the host or entered into reports can result in fewer data entry errors.

File Storage and Creation: The intelligent 3270 program can utilize local files for a variety of DP applications while in intelligent 3270 emulation mode.

File information can be retained locally while communicating transactions to the host. This information can take the form of inventory changes, ordering information, numerical changes to price totals, fees collected or monies dispersed. At the end of the day, week or month, summary reports can be done locally rather than through remote interaction. In addition, any type of management or summary report can be generated on the local microcomputer system.

The features of an interactive and batch terminal are combined into one device and downloading of formats, programs and data files from the mainframe as 3270 transactions is provided.

Nonstandard Peripherals: Standard nonintelligent 3270 systems do not recognize the use of devices other than CRT displays and printers. Intelligent 3270 programs running on microcomputer systems can utilize peripherals such as plotters, disk drives, diskettes, tape drives and card equipment.

Without any changes being made on the host system, a device address can be listed as a terminal or printer in the host configuration for the particular intelligent 3270 microcomputer system you're utilizing with, for example, a disk drive. Any information addressed to that disk drive and received by the microcomputer system can then be routed to the disk.

This opens up the availability of batch data transfer under 3270, thus combining features of an interactive and batch terminal into one device. It also provides for the downloading of formats, programs and data files from the mainframe as 3270 transactions.

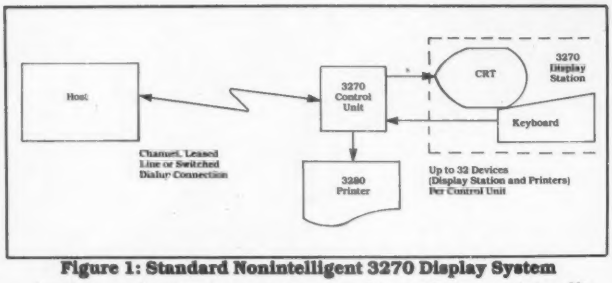


Figure 1: Standard Nonintelligent 3270 Display System

Another application is to associate a nonexistent hardware device with a device code identified at the host.

When the intelligent 3270 software recognizes this virtual device, it can perform a number of utility housekeeping or diagnostic functions.

It can also be utilized to execute a program on the remote microcomputer system; instead of displaying the results of that program on the local system, the intelligent 3270 capability can send the screens back to the host or network. This provides remote program execution for any microcomputer system on the network.

Security: Security is an important issue, especially with an intelligent programmable device on the network. The fact that intelligent 3270 emulation is running allows any number of different security levels to be built within the interface to the local operator — in terms of sign-on; password; sign-on to application; file and read-only file passwords; and access to information in other terminals within the network.

Pass-Through and Filtering: Because local disk files and storage are available, distributed processing and distributed data base applications are possible. These applications can handle some inquiries and transactions on the local file through the intelligent 3270 program either without any interaction with the host or with a single transaction that summarizes the transaction setup taking place locally. Typically, the inquiry would be for a particular individual, a specific part number or some other identifiable item expected to reside in a certain office under a partitioning of the total data base.

If the item is not available within the local microcomputer system, the intelligent 3270 emulation automatically formats an inquiry to the network, receives a response from the network and presents the information to the user. At this point, the information received may be automatically utilized to add a record to the local file so that subsequent inquiries will then find the information immediately.

Inquiries can also be filtered so that by checking the information entered, the local microcomputer system can reject the inquiry before it ever goes to the host. Intelligent 3270 emulation can be utilized in many ways to enhance the 3270 operation while still remaining compatible with the wide variety of software packages and access methods that support 3270 emulation on the host end.

Benefits: A system featuring 3270 emulation carries with it several benefits:

- Error-catching program logic enhances user productivity.
- The user doesn't wait a long time for completed transactions.
- A variety of step-saving computational software can be built into the data entry process.
- Cash files, inventory, instructions and accounting programs can enhance the operator's use of the terminal system.
- Use of local format storage, local files and pass-through capability can reduce off-load communications and mainframe resources.
- Support of batch functions, nonstandard devices and remote execution of programs can eliminate redundant computer hardware.

Pitfalls: Pitfalls do exist in the use of the intelligent 3270 capability. Although IBM is moving more and more toward intelligent 3270 or application interface to 3270 communications, IBM has still not indicated it will modify mainframe software to recognize the 3270 as an intelligent device. This can create a problem when implementing intelligent 3270 in such environments as IMS message format service, which will not recognize or provide for even simple intelligent 3270 applications like local format storage. Nevertheless, as pointed out, numerous things can be done utilizing the intelligent 3270 capability without changing anything on the host end.

Having an intelligent 3270 device implies a software support resource not required in a standard nonintelligent 3270.

As compatibility with IBM evolves, so must the investment in software emulation in order to remain consistent with standard requirements.

Features and Capabilities: The following are points users should consider when choosing an intelligent 3270 microcomputer system.

- True connection to application: Be certain the intelligent 3270 runs with an interface to logic and programs the user can edit over a period of time to meet changing needs.

The intelligent 3270 emulation program should link to other programs for the receipt of information or passing of information. Support is also required for the passing of information keyed or entered from various media to be merged or compared with transactions to or from the host.

- Background/foreground concurrency: The system should make it possible to move the 3270-emulation program out of a foreground partition associated with one of the terminal devices to an attached or detached background partition, where, in essence, it can float while the user loads a different program into the foreground.

Communications and handshaking with the network will continue while the user executes a different off-line program in the foreground. When required to interact with the host, the user can then resume the 3270-emulation mode by switching back to the program suspended in the background.

The 3270-emulation program should function within a multiprogram, multitasking executive which allows one device — or more — on the system to be a 3270 terminal interactive with the network.

At the same time, one or more other devices on the terminal system are executing as local personal computing terminals, compiling and executing programs, entering data or operating a standard application software package such as word processing.

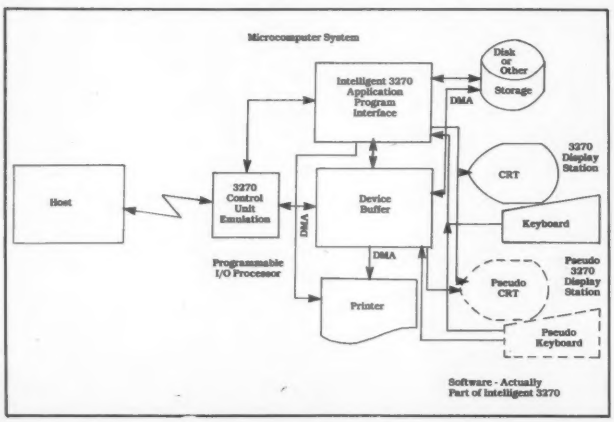


Figure 2: Micro-Mainframe Connection Using Intelligent 3270

The chosen microcomputer system should be capable of multiple communications connections; it will thereby provide links between the microcomputer system and other microcomputer systems and between the microcomputer system and more than one remote network connection.

The most popular and therefore the most powerful configuration would be a system that can run several 3270 jobstreams through one terminal or through multiple terminals utilizing windowing, concurrency, multiprogramming and shared devices.

In analyzing the variety of products available in the marketplace today, users must determine that the product's vendor have a commitment to following IBM's lead. IBM has undertaken a significant program of linking Systems Network Architecture (SNA) networks, tying personal computers into 3270 SNA networks and tying personal computers and other office support systems into a more tightly bound mainframe-to-micro connection for sharing resources and information and processing documents.

Planning the Micro/Mainframe Link Under 3270: Several alternatives to the micro/mainframe link exist. The microcomputer system can be viewed as a dial-up asynchronous device to a protocol converter which then acts as a 3270 look-alike to a network. Various vendors are providing intelligent controllers for connection of popular microcomputer systems to 3270 networks. The best alternative is to find one vendor supplying a packaged clustered system that will emulate 3270 devices under a variety of line speeds compatible with bisynchronous or SNA/Synchronous Data Link Control networks and operating under a multiprogramming, multitasking executive. This provides the most hardware flexibility and economy.

In general, the end user will see the implementation of a micro/mainframe link as providing access to data base information without entry into a local system. It will also provide:

- Access to mainframe resources not available on a microcomputer system.
- A communication vehicle to other nodes.
- An electronic mail capability.

The micro/mainframe link will also enhance the operation of the local office by reducing costs and increasing productivity.

An intelligent 3270 capability can relieve applications backlog development and the burden on the central computer. It offers the ability to maintain central control of the information resource and data integrity, as well as control over the proliferation of various devices throughout the network.

OA

Blahut is vice-president of customer support in the Systems Division of Mohawk Data Sciences Corp., based in Parsippany, N.J.

SNADS?

BY MICHAEL ZISMAN

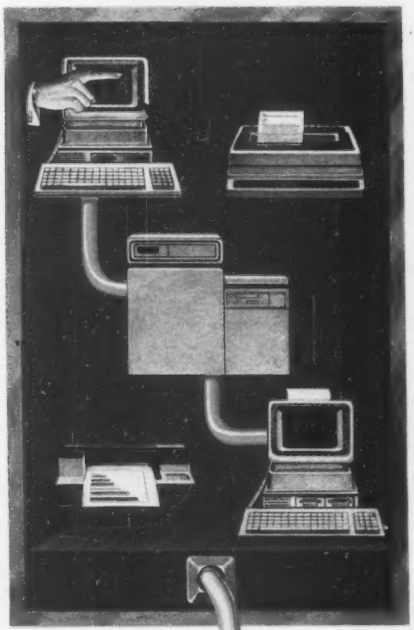
As office automation systems have proliferated, the requirements for document distribution have become more focused and more complex. Different types of workstations must be supported, and these workstations are often connected to multiple hosts or other types of cluster controllers — for example, the IBM 5520 controller.

In this process, customers have made an important discovery; they have realized that the very substantial investment in host-based DP networks must be leveraged for OA applications. Users simply will not install another network for OA or electronic mail. Vendors have responded to these emerging requirements with a variety of non-integrated solutions.

In the IBM world, Profs serves professionals in the VM environment; the IBM 5520 system has its own electronic document distribution service; Displaywriters communicate with each other on a point-to-point basis; and the Disoss program product provides

Hewlett-Packa surge in office

Discover the Personal



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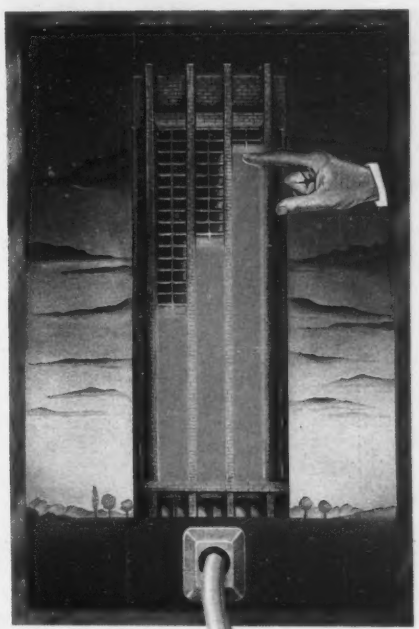

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host-based document distribution and library services. Originally implemented to interconnect IBM 8100 office systems, Disoss has evolved to provide library and distribution services to a variety of IBM office system products.

IBM has introduced and implemented a number of architectures to achieve better integration across this variety of products. In the document distribution area, these architectures have culminated in Systems Network Architecture Distribution Services (Snads).

Snads will, in all likelihood, become an industry standard. As with most IBM architectures and products, understanding the Snads vocabulary is a greater challenge than understanding its functionality.

Snads builds on a number of other IBM architectures. In 1974, IBM introduced Systems Network Architecture (SNA) as a standard architecture for connecting IBM hosts to terminal networks. Over the past 10 years, IBM has continually enhanced SNA, and it now supports multihost networks supporting a wide variety of devices.

Fundamentally, however, Snads provides for synchronous transmission of messages through a network. The message is sent from one logical unit in the network to another logical unit through a session. Both logical units must be active, and the session must be established before message traffic can be initiated. With logical units and sessions, SNA provides real-time and reliable communications facilities between nodes in a network.

SNA started as a host-based network of the master/slave type. It has taken IBM 10 years and great effort to evolve to peer-to-peer/process-to-process architectures. For years, the basic notion within SNA was that of a terminal talking to a program in a host, as opposed to the more general notion of program-to-program communications.

In 1982, IBM introduced SNA Logical Unit 6.2 Advanced Program-to-Program Communication (APPC). Logical Unit 6.2 defines the protocols for interprogram communications for programs executing in logical units in an SNA network. With Logical Unit 6.2, SNA begins to take on the critical character of a distributed operating system. Because office systems typically involve sophisticated workstations connected to each other and to mainframes, program-to-program communications is very important.

In 1983, IBM introduced and made publicly available two architectures originally considered to be application architectures on top of, but not actually part of, SNA. These were Document Interchange Architecture (DIA) and Document Content Architecture (DCA).

DCA defined the standards for specifying the contents of a document — the document can consist of text, image, data and voice. DCA also defined standards in the text area, such as how margins are set, how tab racks are defined and how underlining is specified. Both a final-form DCA (Level 2 DCA) and a revisable form (Level 3 DCA) were specified. In its 1981 Statement of Direction about office systems, IBM made a commitment to provide revisable form document exchange among all its office systems. For this reason, Level 3 DCA is particularly important.

The envelope in which DCA formatted documents is stored is defined by DIA. Although the architecture was conceived for document enveloping, nothing in the architecture restricts the contents to documents. DIA defines a document interchange unit (DIU) and a number of function sets that define commands for sending documents, receiving documents, searching libraries and so on. A document interchange unit consists of commands, parameters for these commands and documents. A document interchange unit includes both the envelope and the contents of the envelope.

The first IBM product to implement DIA was the 5520 administrative system. The 5520 also implemented the original DCA architecture. Although very similar to Level 3 DCA as it exists today, the original DCA architecture was later relegated to 5520 Internal Form.

With DIA and DCA, IBM had the basis for standardized electronic document distribution across products, but one essential piece was still missing. What good are standardized letters and standardized envelopes without a standardized postal system? The original postal system for DIA/DCA was the 5520 control program, and a number of other postal systems had evolved, including Disoss, Profs and others.

An architecture for a postal system that would integrate a diversity of product lines would necessarily be tightly integrated with the SNA transport system, and IBM recognized that fact. In early

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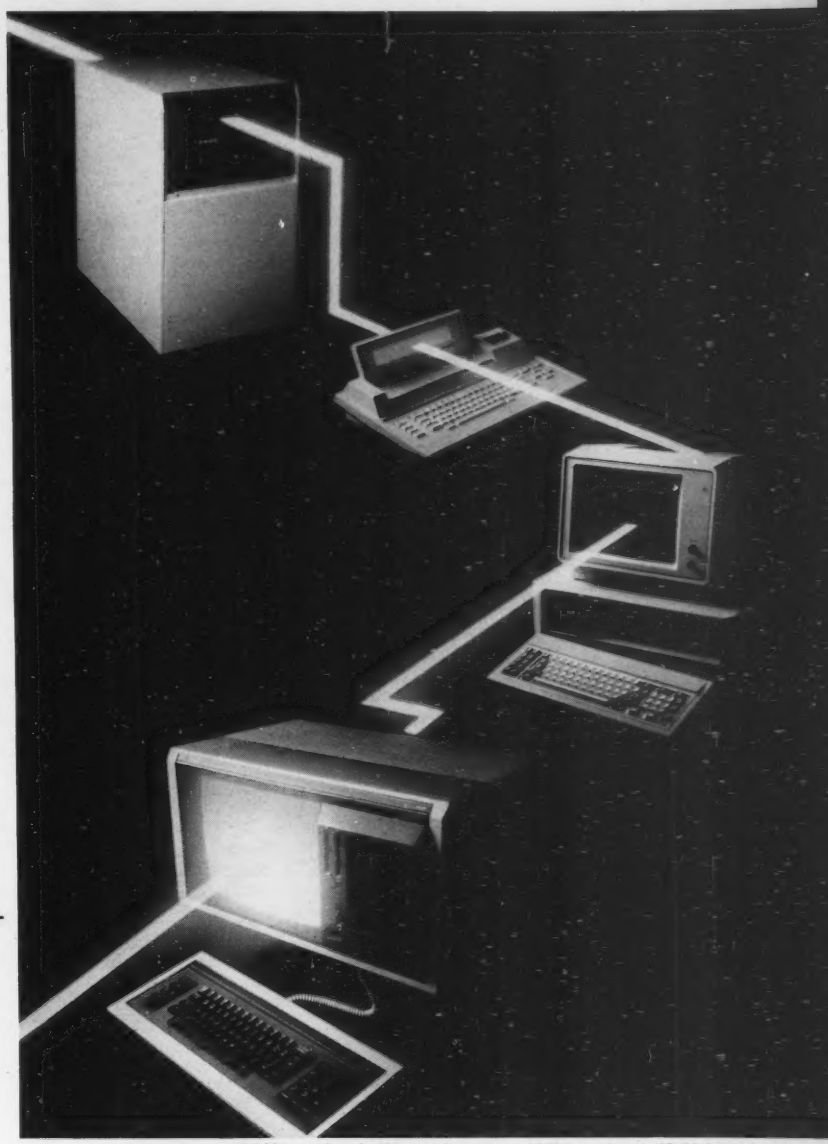

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documents describing DIA/DCA, these architectures were considered different from and on top of SNA. When Snads' design was undertaken, however, it became clear that one could not differentiate the postal system from the envelope architecture. At that point, DIA was clearly pulled under the covers and became part of SNA and SNA distribution services.

Snads is an architecture, not a product. It is an architecture that can be implemented in a number of IBM and non-IBM products, from large mainframes to small workstation controllers. Snads' objective is to provide a reliable and efficient service for store-and-forward transmission of documents and other objects to users in an SNA network. In simple terms, Snads is the definition of a multimode, electronic mail system. The essential unit in the Snads architecture is the Distribution Services Unit (DSU). In logical terms, a DSU is a set of programs that acts as a local post office and supports a well-defined set of interfaces for communications with programs that make use of the postal system.

A DSU user requests the DSU to transport an object to another user. The DSU is responsible for accepting the object, queuing it for transmission through the network, routing it to potentially intermediate DSUs, then to a destination DSU and, finally, to the intended recipient.

It is very important to note that Snads provides asynchronous communications on top of the SNA synchronous transport system. If user A wants to send an object to user B, A need not be concerned with whether B is active or signed on to the network. User A simply sends the object off to a local DSU. The DSU is then responsible for routing it through the network and making it available to the recipient when the recipient requests the object.

DSU-to-DSU communications makes use of the Logical Unit 6.2 program-to-program communications protocol to transmit DIUs. Now, however, DIU means "distribution interchange unit," not "document interchange unit." The format of the distribution interchange unit is, however, the same as that of a document interchange unit.

Note the word "object." Although most objects transported today by Snads will probably be documents, nothing in the Snads architecture restricts its use to documents, as is the case with the postal system. Snads' concern is only the front of the envelope, not what is in the envelope. In future, a need to transport speadsheets, calendars, files and other strongly typed objects will exist. There is a migration in the IBM literature from the use of the term "document" to the term "object."

One important service provided by a DSU is directory management. A major objective of the Snads architecture is defining a set of rules that can be optimized for machines of various sizes and capabilities. For example, on a large mainframe with a great deal of storage, one might want a very detailed directory that can specifically identify each user and route a document to its destination in the most optimal way. In a very small system with limited storage, however, one might have to live with a small directory that uses a large number of defaults to get envelopes and their objects headed in the right direction.

Snads provides this capability. Each directory is a table, mapping user names to DSU names. When Snads receives a request to send an object to a particular user, it looks up that user in the directory to determine the destination DSU. It then sends the DIU to the destination DSU, possibly through one or more intermediate DSUs.

When the object finally reaches the destination DSU, that DSU will search its own directory for the recipient user. The user will usually be found, and the associated DSU will be the current DSU.

In some cases, however, a new DSU will be specified. For example, the user might have moved; if this proves to be true, the destination DSU will simply forward the object to the new destination DSU.

Thus, users can move around the network with no need to make major changes in directories or to synchronize directories hastily. However, coordination of directories in different DSUs will be a major challenge.

The Snads architecture was also designed to make efficient use of the SNA network by minimizing network traffic. For example, if an object is to be routed to a number of different users and a number of these users are at the same destination DSU, Snads will send only one copy across the network, with a specification of the listed users.

Snads also attempts to make efficient use of local storage. In most store-and-forward systems of this type, the postal system first copies the object into a spool file before transmitting it on to the next destination. Snads does not use this approach because of the requirement for substantial local storage. Instead, it uses a server approach.

An application program that requests the DSU to transmit an object does not give the object to the DSU. Rather, it gives the DSU the name of a program that can provide the object when the DSU requires it. The DSU schedules the activity. When the DSU is ready to transmit the document to the next DSU, it invokes the specified server, which provides the actual object to the DSU for transmission. This adds substantial complexity to the Snads implementation.

Fundamentally, Snads is nothing more than a store-and-forward switch. However, in an attempt to provide an architecture that scales over many types of workstations, IBM has added a great deal of functionality and complexity to the Snads model.

It is likely that other products will support the Snads architecture. It is unlikely that a DSU would be implemented within a single workstation, such as a personal computer. Rather, the DSU fits into a higher level node that interconnects a number of workstations. One does not install a post office for one family; a post office serves a community.

Other vendors have specified architectures that provide functionality similar to Snads. For example, Digital Equipment Corp.'s message router provides for message transmission in a DEC OA environment; it uses the Decnet transport system and provides functionality similar to Snads. Similarly, Wang Office, a new product of Wang Laboratories, Inc., provides a store-and-forward document distribution system with capabilities very similar to Snads.

The approaches offered by both DEC and Wang are substantially simpler than the Snads architecture, but with limitations. It is likely that Snads will become an industry standard, and bridges will need to be built between the DEC message router and Snads, for example, or between Wang Office and Snads.

As stated above, Snads is not a product; it is an architecture that other products can implement. Disoss Version 3.2 and 5520 Release 3 will be the initial IBM products to utilize the Snads architecture. They are scheduled for first customer shipment in the fourth quarter of 1984.

With the Snads architecture implemented in these two products, the relationship between Disoss and the 5520 will be quite different. Today, Disoss maintains essentially a master/slave relationship with the devices it supports. Furthermore, Disoss operates in a single host, and all devices supported by that Disoss system must be connected to a single host.

With the Snads implementation, the relationship will be quite different. Disoss will be a DSU, and each 5520 controller connected to Disoss will be a DSU. Whether a 5520 routes an object to another 5520 or to a Disoss DSU is immaterial; it is simply DSU-to-DSU Logical Unit 6.2 communications.

Likewise, multiple-host Disoss implementation is provided in Version 3.2 of Disoss. Because each Disoss copy is a DSU, Disoss-to-Disoss communications is simply DSU-to-DSU communications. It is important to realize that no essential difference exists, whether a document is transmitted from a Disoss in one host to a Disoss in another host; from a Disoss in one host to a 5520; or from a 5520 controller to a 5520 controller. Each of these is simply an example of DSU-to-DSU communications.

One can easily envision an implementation with two hosts connected together, each with a number of 5520 controllers. A 5520 connected to host A could request distribution of a document to a 5520 attached to host B. The DSU in the first 5520 would attempt to route the document to the other 5520. Each host would simply be an intermediate DSU. The document would travel from the first 5520 to host A, as an intermediate DSU; to host B as an intermediate DSU; and, finally, to the destination 5520, where it would be made available for the recipient.

It is highly likely other products will support the Snads architecture. It is unlikely a DSU would be implemented within a single workstation, such as a personal computer. Rather, the DSU fits into a higher level node that interconnects a number of workstations. One does not install a post office for one family; a post office serves a community.

In recent years IBM has announced a number of architectures. Snads, the newest architecture, builds on SNA Logical Unit 6.2 to provide DSU-to-DSU, program-to-program communications. The DSUs communicate with the DIUs. Although these are called distribution interchange units, they are exactly the same as document interchange units in DIA.

It is therefore fair to say that Snads uses DIA for its envelopes. These envelopes might contain documents defined with the DCA architecture, but in any case, they will be transported using the basic SNA transport mechanisms. As one can see, Snads, SNA Logical Unit 6.2, DIA/DCA and basic SNA transport mechanisms all come together to provide a cohesive architecture for asynchronous communications of objects in OA networks.

It will be essential for other vendors to implement DSUs in their own environments or to provide a bridge from their environments into the Snads environment. Quite likely, third-party software will provide these bridges. OA

Zisman is president of Integrated Technologies, developer of the OA integrator product, Soft-Switch. The firm is based in King of Prussia, Pa.

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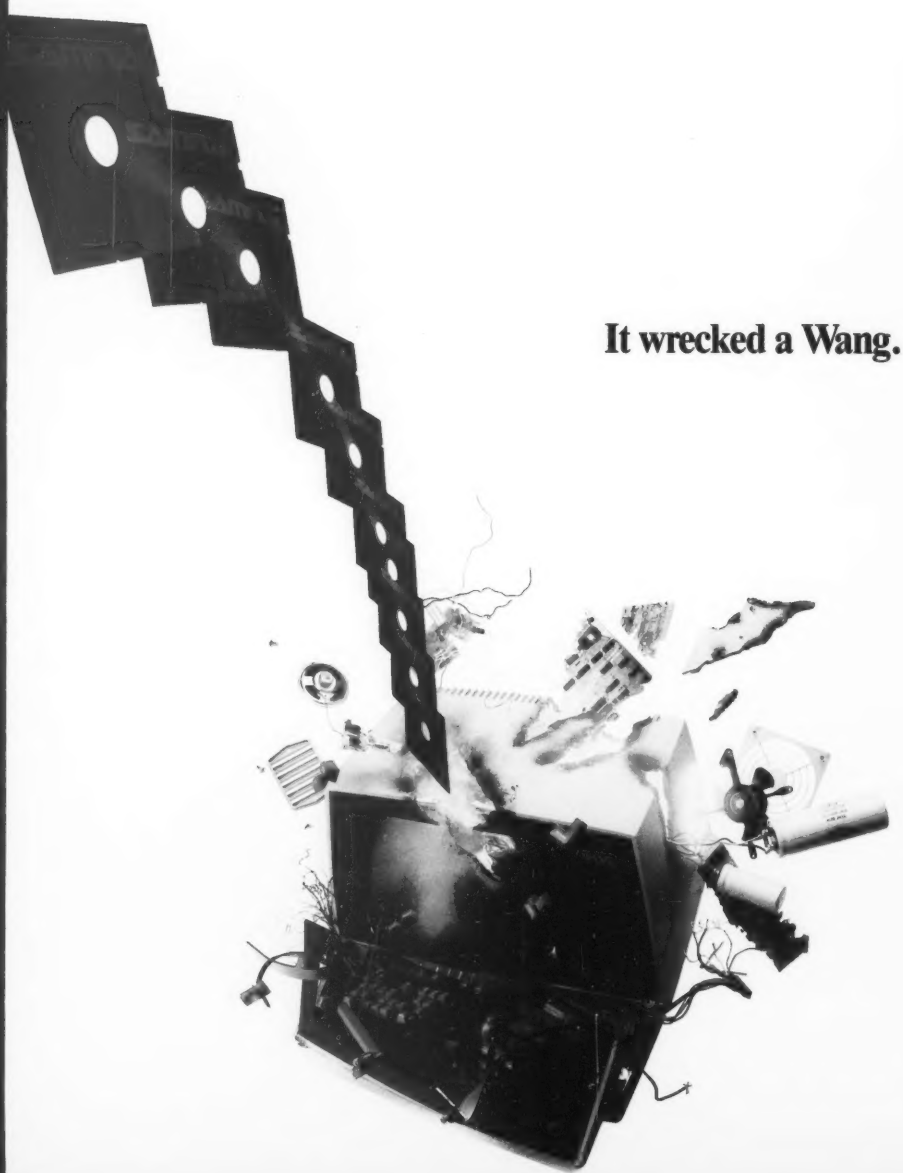

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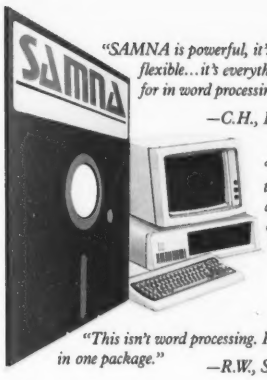

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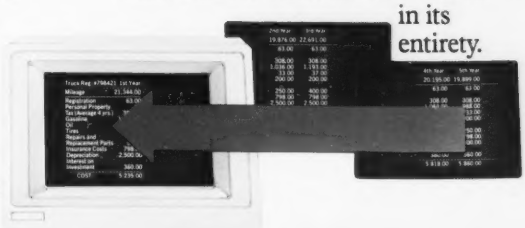
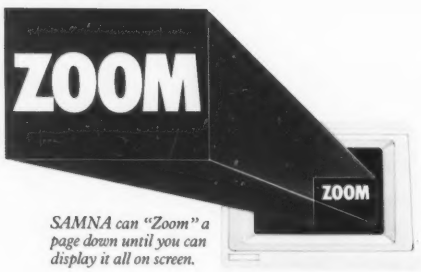


Wide page? SAMNA "folds" it to compare left and right margins side by side.



SAMNA can "Zoom" a page down until you can display it all on screen.

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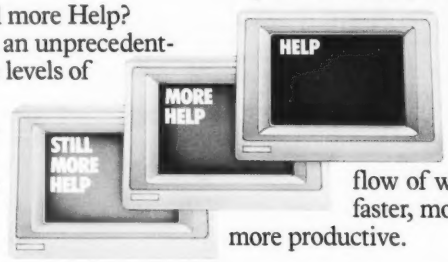
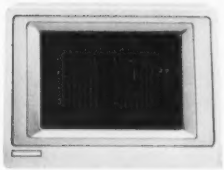


Call for Help and SAMNA will lead you all the way through any function.



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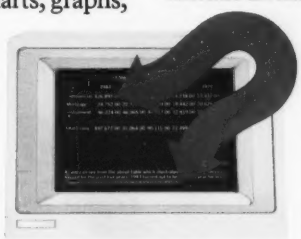

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Copy to buffer or file and insert in new location		•	•
Move to buffer or file and insert in new location		•	•
Stored paragraphs accessible by i.d.		•	•
Automatic index generation (alphabetized and with page references)		•	•
Five function math		•	•
Full pathname support for all file functions		•	•
Merge lists of letters in background while working on screen		•	•
Print wheel changes in middle of text		•	•
Proportional print		•	•
Section/outline number in three styles		•	•
Automatic generation of Table of Contents		•	•
User defined functions to record and/or play back commands		•	•
Wildcard support for all file functions		•	•
Proof for spelling errors and hyphenation—automatic corrected options provided—Merriam-Webster dictionary		•	•
Automatic Merge—with selection and sort capability	•	•	•
List management—of 99 fields, unlimited length, selection and sort capabilities	•	•	•
File back up—two versions	•	•	•
Disk/Directory back up	•	•	•
Bold mode or for revision—displayed on screen	•	•	•
Center mode or for revision—displayed on screen	•	•	•
Caps mode or for revision—displayed on screen	•	•	•
Justify mode or for revision—displayed on screen	•	•	•
Underline mode or for revision—displayed on screen	•	•	•
Super mode or for revision	•	•	•
Sub mode or for revision	•	•	•
Double Underline mode or for revision	•	•	•
Required page break	•	•	•
Connect line mark—prints two lines as one	•	•	•
Connect space to prevent words from being separated	•	•	•
Move cursor forward by word, line, paragraph, sentence, page and file with ◇◇◇ arrows.	•	•	•
Move cursor backward by word, line, paragraph, sentence, page and file with ◇◇◇ arrows.	•	•	•
Go to edges of screen, specified phrase, other file, particular page	•	•	•
User defined defaults for back up, sheet feed, default drive/directory, print wheel sequence, default keyboards, decimal positions in math, negative number display, color graphics, use of color on color monitors	•	•	•
Delete forward/backward in shaded amounts, file(s) from disk	•	•	•
DOS 2.0 support for directories and sub-directories	•	•	•
Direct typing from keyboard to printer—bypass screen	•	•	•
Display up to two files simultaneously	•	•	•
Rename, copy, delete files without closing document or returning to DOS	•	•	•
Repage with widow/orphan control, exact paragraphs, exact lines	•	•	•

FEATURES	SAMNA WORD II	SAMNA WORD III	SAMNA +
Search and replace with case and attribute consideration	•	•	•
Fold wide documents to compare columns	•	•	•
Exits to operating system	•	•	•
Zoom—miniature page display	•	•	•
Up to 300 footnotes of unlimited length	•	•	•
Multiple formats stored with file	•	•	•
Up to 30 headers and footers per document, unlimited length, option to alternate	•	•	•
Three levels of help—for each function—progressive and contextual	•	•	•
Automatic paragraph indent	•	•	•
Insert text from keyboard as you type, from a stored glossary or from a file	•	•	•
Line drawing	•	•	•
Change pitch and line spacing in middle of document	•	•	•
Number alignment on decimal or comma	•	•	•
Overstrike characters or lines	•	•	•
Auto paging at input with displayable page breaks	•	•	•
Auto page numbers at choice of location and starting number	•	•	•
Insert and place markers for form fill in	•	•	•
Queue up to five print jobs	•	•	•
Print a block of text from screen, page from screen, file from disk	•	•	•
Print in background while working on screen	•	•	•
Protected text from printing on two pages	•	•	•
Scratchpad for typing and printing without saving on disk	•	•	•
Translate ASCII files to use with Samna or Samna files to ASCII	•	•	•
Vertical center lines on page	•	•	•
Initial support	•	•	•
Extended support	•	•	•
800 number	•	•	•
On screen disk based tutorial	•	•	•
Illustrated reference manual	•	•	•
Easy, seamless entering and exiting between spreadsheet and the word processor			•
Multiple spreadsheets in one document—floating cells embedded in text, spreadsheets linked, floating cells linked to any spreadsheets in document.			•
Alpha-numeric naming for spreadsheets, columns, rows, ranges, or cells			•
Uses cells or ranges—relative and/or absolute references to cells or ranges.			•
Full complement of mathematical operators, automatic alignment of numbers			•
Full support of date functions for aging purposes, including use of DOS date			•
Full complement of number formatting within columns and rows to include scientific notation, currency, variable decimal positions, and ability to bold and/or underline cells			•
Insertion, deletion and movement of columns or rows, and erasing or copying ranges, columns, rows, and cells to include formulas			•
Specifies ranges, columns, rows and cells via shading or with coordinates			•
Protects ranges, columns, rows, cells or entire spreadsheets			•
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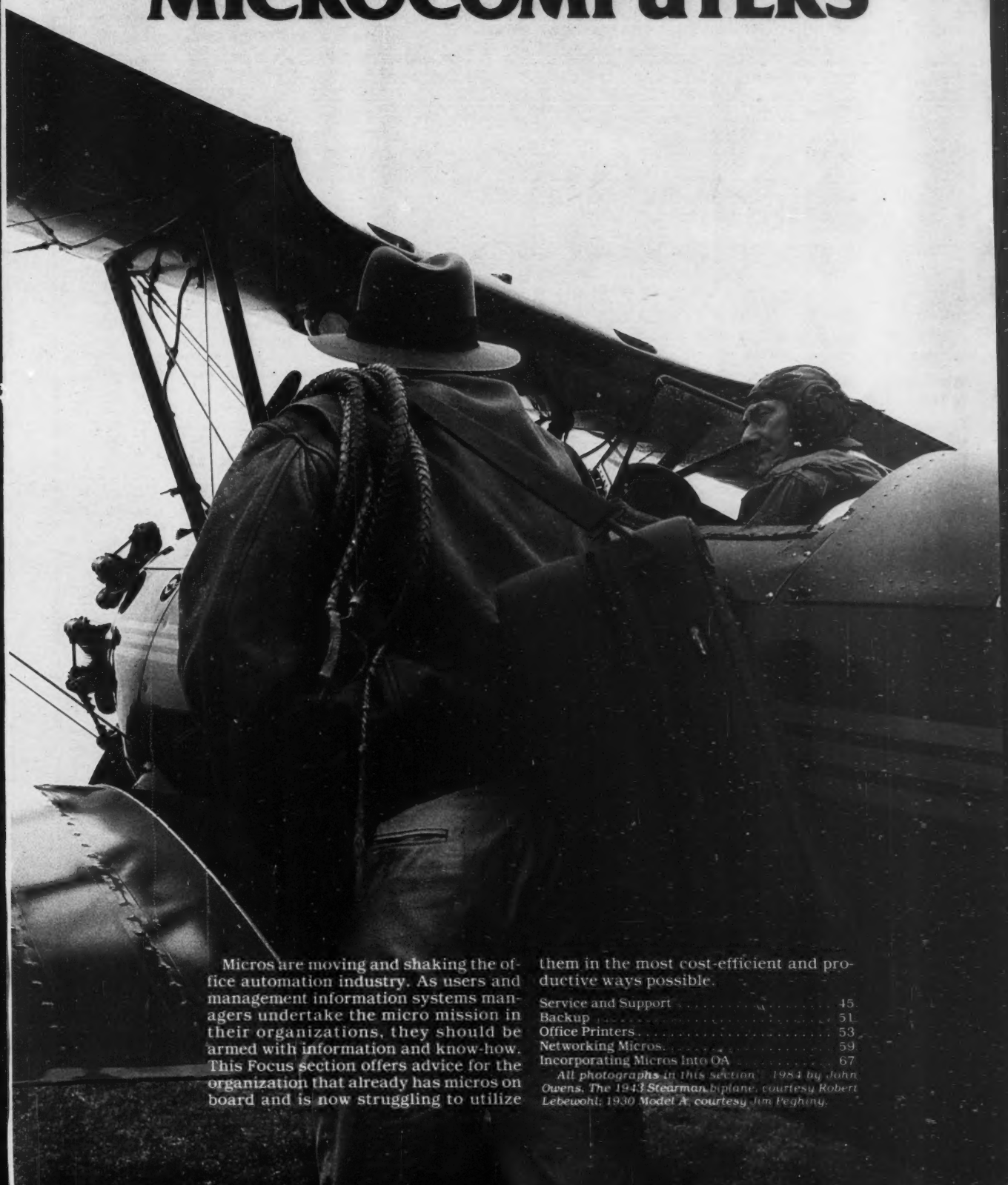
OA FOCUS: MICROCOMPUTERS



Micros are moving and shaking the office automation industry. As users and management information systems managers undertake the micro mission in their organizations, they should be armed with information and know-how. This Focus section offers advice for the organization that already has micros on board and is now struggling to utilize them in the most cost-efficient and productive ways possible.

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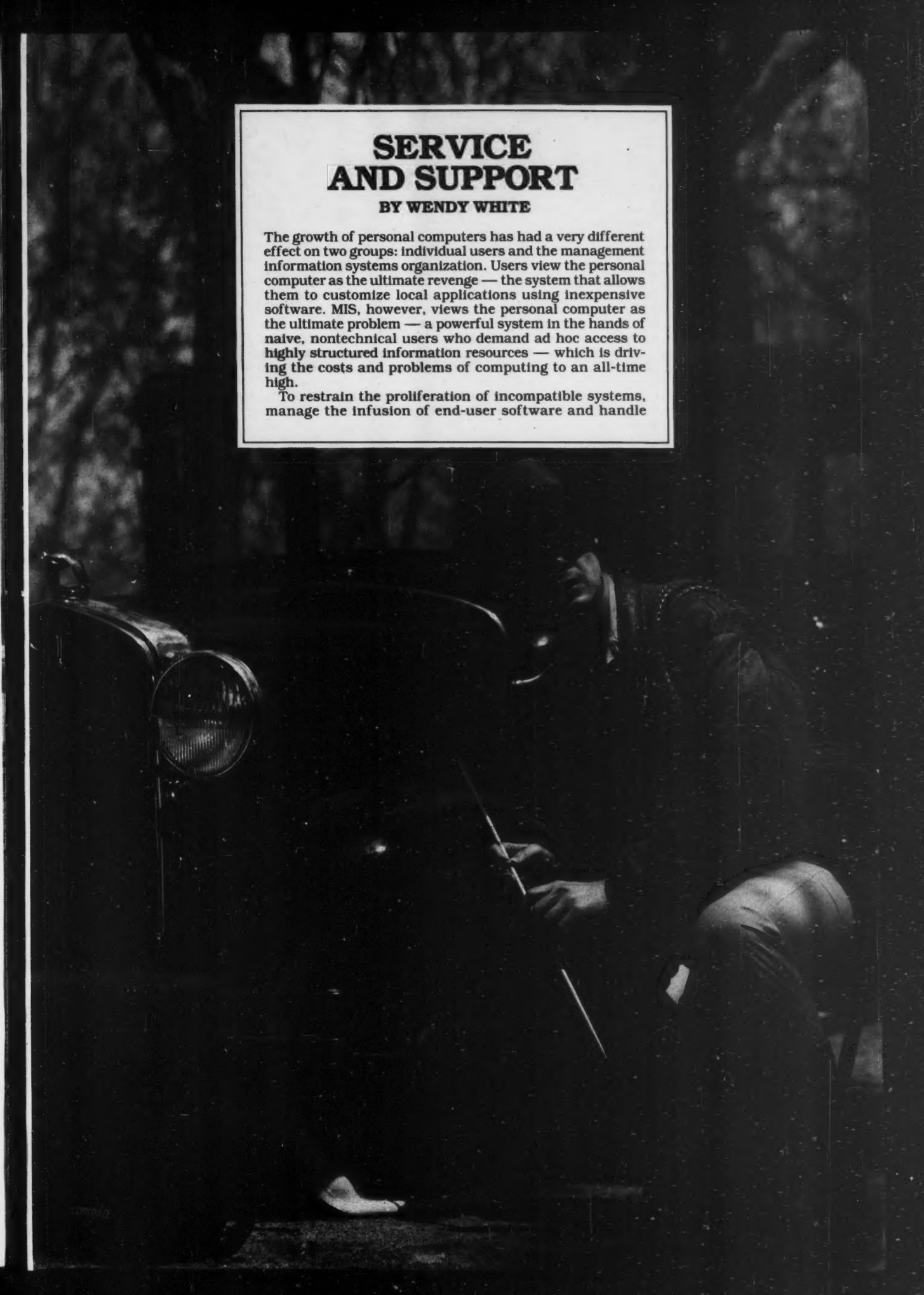


SERVICE AND SUPPORT

BY WENDY WHITE

The growth of personal computers has had a very different effect on two groups: individual users and the management information systems organization. Users view the personal computer as the ultimate revenge — the system that allows them to customize local applications using inexpensive software. MIS, however, views the personal computer as the ultimate problem — a powerful system in the hands of naive, nontechnical users who demand ad hoc access to highly structured information resources — which is driving the costs and problems of computing to an all-time high.

To restrain the proliferation of incompatible systems, manage the infusion of end-user software and handle

growing demands for computer education, MIS departments are being asked to assume a new role.

This role requires breaks with the traditional focus on the system as a solution and focuses on the user as the ultimate driver of the technology. For many, this demand for end-user computing power and resources threatens their traditional roles. For others, it is an opportunity to gain widespread acceptance as the keepers of all corporate technology resources.

Information management technology has traditionally been left to the MIS department, where problem-solving could be addressed within the framework of highly structured rules and decisions.

Today, however, the effects of the personal computer revolution have pressured the MIS staff into assuming responsibilities to curtail mounting user and equipment confusion while still preserving its traditional corporate role.

According to most evidence, the personal computing phenomenon is not about to go away. Rather, market trends indicate the installation of these discrete systems will accelerate over the next few years, and their interconnection on a departmental basis will lead to a new generation of requirements on which the rationale for OA will be based.

MIS will have to play an active role during this evolution. OA requires an extensive use of networks for interconnection and relies heavily upon shared software and resources to deliver its benefits. Further, successful OA requires the involvement of highly trained and technical managers for design and implementation and an attention to detail that spans the workstation issues to the mainframe itself.

Failure to address these issues can cost a company time, money and the viability of existing equipment investments. One of the less talked about effects of the microcomputer revolution takes the form of hidden costs that quickly emerge at every desktop. This productivity tool requires a wealth of add-on equipment and the addition of more and more feature-rich software to maintain parity with growing user expectations.

The cost and effect of constantly upgrading systems is already well known. According to recent information, an initial investment of $2,000 to $5,000 per micro spirals to over $20,000 during the first year. And, in order to meet continued applications requirements, the stand-alone personal computer will persist in exhibiting a voracious appetite for add-on peripherals such as floppy disks, hard disks, printers, communications and memory expansion boards.

As applications continue to drive the need to expand the capabilities of the stand-alone workstation in order to access departmental and multi-departmental data bases, capacity will easily be surpassed. At this next evolutionary step, the user decides it has become necessary to bring the power of the mainframe to his desk. He may also consider the benefits of networking to gain increased interconnectivity throughout the organization as well as the ability to tap into external information sources.

Incremental software costs further compound the rising hidden costs during the first year as the user acquires at least one additional operating system and numerous applications programs like word processing, spreadsheet and data base management software packages.

Although the user may accept the evolving costs of using his new micro and may conveniently couch

them between traffic tolls and valet expenses over time, invisible costs also emerge that he may not be aware of or choose to ignore.

These costs are difficult to quantify or measure; they concern the training and support required by a new user to become proficient and productive at the new system. For many users, the confidence and bravado felt at the time of purchase quickly gives way to hours of frustration as the disillusioned new user struggles to become self-reliant at the personal computer. The effects are twofold: lost management resources spent fussing with the machine and the effect of improperly used technologies on the decision-making process.

While users struggle to master their selected systems on an ad hoc basis, a variety of traditional support and service methods continue to be evasive. Vendors, once the right arm of the user, will hastily point to the economic realities of offering support and service for these "low-cost" systems. They contend it is not possible to offer an inexpensive machine and free high-cost support. Because distribution channels must operate on a small profit margin, they also maintain that user training must be limited to a minimum introduction to the micro and its basic applications. Users who have gone beyond this must rely upon tutorial diskettes, poorly written manuals and a remote 800 telephone number designed to handle only the most remedial problems.

In addition to limited vendor support for the hardware, the software vendors also avoid addressing support issues involved for performing advanced applications. Users are faced with limited self-instructional packages. Assuming the user succeeds in mastering the system and the applications, the burden remains upon the nontechnical individual to interpret these tools for his particular tasks.

Users often consider lack of support an inconvenience, but research indicates these support issues actually translate into direct costs for the organization. According to experts, invisible costs can actually inflate the basic hardware cost as much as two to three times its original purchase price. Although these invisible costs may never surface as budget items, these ubiquitous culprits of time and energy have eroded productivity, not improved it.

If corporate management begins to see through the array of hidden costs brought about by the numerous micros that many managers and professionals have ushered into the organization, it won't be long before it also detects the invisible costs. The inconspicuous micro purchased for a mere $5,000 a year ago is now invested with a total value of $35,000, which is almost tantamount to purchasing a minicomputer to accommodate a single user's requirements.

As organizations become more aware of the impact micros are having, they are beginning to establish guidelines for the costs and justification of acquiring these machines. Solutions vary; current trends reflect a slight departure from the tightly structured centralized MIS group governing all systems decisions. If, however, an organization is too laissez-faire and permits liberal buying authority among individual users, before long every computer salesperson within a 50-mile radius will descend upon the company. This results in a host of incompatible and noncommunicating systems cropping up throughout the organization.

If equipment decisions are centralized and controlled by the MIS department, the company will no doubt be assured that those who understand computer technology will make the best decisions. Unfortunately, this may not satisfy users who believe they understand their applications better and do not want MIS to dictate to them.

Given the range of the support requirements, is any support program flexible enough to meet the diverse needs of both MIS and the independent user to the benefit of the total organization? The information center almost meets that goal.

In the past few years, more than 1,400 information centers have sprung up — more than 35%

(Continued on Page 49)

Users often consider lack of support an inconvenience, but research indicates these support issues actually translate into direct costs for the organization.

Find Out What You Need

EDUCATION

- Offer an introductory (and friendly) overview to present the concept of computer hardware and software and computing applications within the organization. This is especially important if information and communications are to be handled via electronic mail and voice message networks.
- Provide a review session of users' applications to understand how their manual tasks can be translated into computer hardware and software operations.
- Provide hands-on training sessions to allow users to perform actual applications at the computer, using appropriate software programs.
- Offer advanced training for users who require highly specialized or technical applications support.
- Alert users to equipment changes or enhancements with appropriate support documentation.
- Offer guest seminars by outside educators.
- Offer tuition refunds to users who enroll in computer classes at local universities or approved education centers.
- Develop screening criteria to assist personnel with the selection of new hires. This will ensure that both management and employees are aware of any computer literacy limitations that may require educational support.

HARDWARE

- Develop hardware selection criteria to ensure that appropriate hardware is recommended and installed.
- Determine appropriate equipment configurations to accommodate future applications and networking requirements as well as upgrades to larger systems.
- Establish compatibility guidelines for hardware and software.
- Coordinate resource sharing among users via departmental clusters or corporatewide networks.
- Establish a central systems (and applications) purchasing unit to obtain the benefits of volume discounts and maintain inventory control.
- Offer rental discount programs to employees as an incentive to learn personal computing, especially if they want to perform at-home tasks at compatible equipment.
- Establish security guidelines to ensure that users understand the issues and necessary procedures required to protect company-sensitive information.

APPLICATIONS

- Review applications requirements to determine if a personal computer is recommended for the tasks involved.
- Review potential applications not currently served by a personal computer.
- Provide "off-the-MIS-shelf" software to accommodate special applications unique to the organization.

SOFTWARE

- Develop software selection criteria to ensure that appropriate software is available for the user's applications needs.
- Establish a software library where users can obtain current software offerings.
- Inform users of software licensing agreements and copyright issues to avoid software program misuse, such as creating multiple copies for giveaway purposes.

(Continued from Page 48)

of them formed less than a year ago. By 1985, that number is expected to double. This trend suggests the centralized approach is still largely favored by MIS. With MIS as the sole custodian of the program, the participation of users outside of DP is limited.

However, a closer look at the information center reveals an interesting parallel to the now virtually extinct word processing centers of the 1970s. That approach centralized all WP equipment to accommodate text processing requirements. The user, dependent upon a turnaround time of four hours to four days, was charged accordingly. The problem with this arrangement was that the user was completely dependent upon the center to get work done in the time required.

The information center approach suggests the same autonomous structure as the WP center. A user must either depend upon the services of the WP center to

perform particular applications or leave this normal work environment to access equipment. This is not only inconvenient; it also widens the perceived distance between the user and MIS.

Today, the user no longer wants to be controlled by any centralized group that mandates what, where, when, how and if a project merits the use of a microcomputer or computing support.

Another potential solution to the problem of support is the company store. The company store is a relative newcomer on the corporate scene. Although it is a somewhat nontraditional approach to serving information needs within the organization, it has on closer examination a rather striking resemblance to the MIS and purchasing departments. Many company stores offer users a standardized selection of personal computers, a variety of applications software and an ample stock of supplies. The potential benefits are large-volume corporate discounts and maintenance of product inventory control. Many stores also offer in-house user support via educational seminars and hands-on training. The down side to the company store is that the user is still relying upon systems decisions made by MIS.

As organizations become increasingly more involved with information technology, it is critical that all levels of personnel within a company understand and participate in the benefits. Information centers and company stores provide viable alternatives, but they still fall short of offering total corporate support. Somewhere between the elusive gray area separating the user and MIS is the opportunity for both groups to share and participate in information management.

The desire to provide a more equitable and arbitrary solution for the MIS organization and the individual users has led a handful of pioneering companies to charter technical assessment groups. Based upon participatory management, technical assessment groups are composed of key technical staff members from MIS and independent users who contribute their expertise to meet information requirements within the organization.

This approach also ensures the establishment of appropriate guidelines and programs to accommodate user needs as well as the larger information-handling requirements of MIS. Its primary areas of responsibility include educational support, hardware and software recommendations and hardware and software applications support.

The technical assessment group presents an opportunity for a corporate nerve center to emerge that can be blessed by MIS and sponsored by MIS and the significant others within the organization. By synthesizing the dynamic human resources within a company, the technical assessment group goes beyond information centers, company stores and the time-worn power struggles that have placed MIS and users at opposite poles.

The effect of microcomputers upon MIS may be a lot like gamma rays that have disturbed a well-ordered universe of information management. Office automation, however, which includes microcomputing, is fertile ground for those who recognize opportunities and are willing to accept the changes required so that everyone in the organization will benefit from the wealth of information resources available. **OA**

White is a senior strategic analyst with the Sierra Group, a consulting firm based in Temple, Ariz.

corporations, the use of computers has greatly increased, but the concern for data security and integrity has diminished. In some companies, the problem is ignored altogether.

Many corporations seem largely unaware of the cumulative effect of data, time and resource losses experienced by personal computer users. It's becoming painfully apparent that there are real costs when backup measures are ignored. Data loss resulting from human error or equipment failure can easily total thousands of man-hours, which translates into an alarming sum in lost dollars. Many users have been jolted out of a false sense of security after erasing the entire contents of their fixed disks by neglecting to specify the A disk drive when formatting a floppy.

As recently as 1981, the typical microcomputer was an 8-bit, Z80-based machine with 64K bytes of random-access memory (RAM). Floppy diskettes with 200K to 400K bytes of storage capacity were a perfect match for these systems; they provided all the storage capacity users needed at that time.

The introduction of powerful 16-bit microprocessors changed the picture. With larger main memories, these machines attracted sophisticated applications previously run only on minicomputers or mainframes. Integrated software, complex operating systems like Unix and the shared-resource capabilities of local-area networks are inherently hungry for large storage capacities. By late 1982, floppy disks were insufficient for most of these applications.

To meet these higher performance and storage capacity needs, fixed disks were introduced, and personal computer users happily accepted them as the mass storage solution. By 1983, the 10M-byte fixed disk drive had become a de facto standard size for microcomputer applications. IBM's PC/XT, incorporating a 10M-byte Winchester drive, legitimized this market.

Along with the fixed disk, IBM supplied two programs: Backup and Restore. These programs enabled the user to take files residing on the fixed disk and store them on one or more floppies. It was also time-consuming — a routine backup operation sometimes required as many as 40 floppies to store the contents of one 10M-byte disk drive.

Although fixed disks easily satisfy storage capacity needs, they do not meet data security needs. Fixed disks are often easily accessed by unauthorized users and, in addition, are inherently vulnerable to a variety of catastrophic occurrences — human error, negligence and malevolence; equipment failure and disruption resulting from natural disasters; and power loss and electrical interference.

This vulnerability led personal computer users to an awareness of the need for removable storage. The fixed disk was fine, but it was impractical without removable backup. Users recognized the advantages — and the necessity — of off-site storage.

The ideal solution to the problem seemed to be a diskette with a large storage capacity — in other words, a hard diskette. 1983 saw the development of removable cartridge disks, and several companies put cartridge disk systems on the market. Unfortunately, the failure rate was high, the systems and the cartridges were relatively expensive and the technology was immature. In addition, no consensus on compatibility between cartridge manufacturers could be reached. The 10M-byte equivalent of the 5¼-in. diskette still doesn't exist.

Instead, an assortment of technologies promising cartridge disks of 5M to 10M byte or even 20M-byte capacity — mutually incompatible — compete for market share. Because minute differences in manufacturing tolerances effectively made "identical" machines slightly different, even identical systems were sometimes unable to read the same disk cartridge.

Cartridge tape manufacturers quickly discovered that the design of the mechanism or the electronics would somehow have to compensate for these differences if the cartridges were to be interchangeable among all drives. One approach was to keep the capacity of the cartridge low and the tolerances correspondingly large so that relatively little manufacturing precision was required to make things work reliably. By the time that solution was offered, the market had become even more megabyte-hungry; a 5M- or 10M-byte cartridge was already inadequate for backing up fixed disks of 20M-bytes or more.

Many companies that planned products based on cartridge disks had to abandon them. Many cartridge disks did not materialize as planned; others were too expensive and carried with them a depressing reputation for unreliability.

Although the situation is already very confusing, numerous new technologies are waiting in the wings of the removable storage device market, each claiming to be the ultimate solution to the backup problem. For example:

- Several companies are now working on "vertical recording," a technique that puts much more data on the same size disk or floppy by means of a technology that orients the magnetic media particles perpendicular to the substrate.
- Late in 1983, 3M Co. announced a new technique for mounting existing flexible media on what they call a rigid "stretched surface" substrate, which reportedly promises to bring the costs of the removable 5M-byte disk cartridge down to the $5 to $10 region.
- High-capacity floppy disk manufacturers are promising to put several megabytes of storage on a diskette or a diskette pack.

Again, there's no standardization, no agreement as to what the cartridges should look like, what technology they should be based on or what size they should be. The user is confronted with a bewildering assortment of choices of technology and manufacturers, none of which offers a complete solution in terms of cost, reliability and storage capacity.

No major computer manufacturer has yet offered a personal computer with a removable high-capacity disk of any form. IBM offers only a fixed disk, as do most of the compatible vendors. To aggravate matters, fixed-disk manufacturers are happily increasing the storage capacity of their products. Fixed-disk drives of 60M bytes to 70M bytes are appearing on the market. By the end of 1984, according to current predictions, at least three or four reputable fixed-disks manufacturers will offer products with close to 100M-byte capacity.

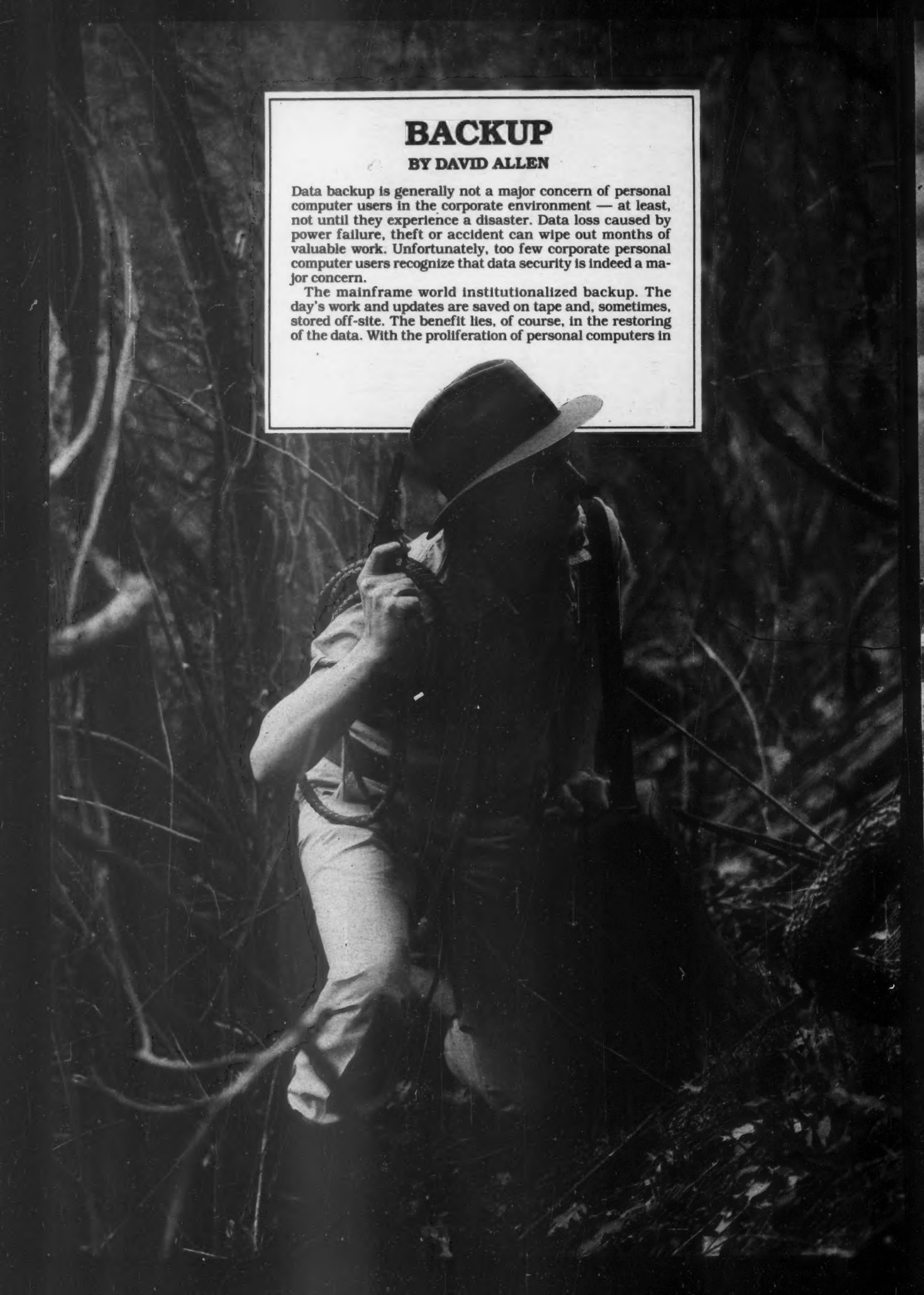
Many users have been jolted out of a false sense of security after erasing the contents of their fixed disks by neglecting to specify the A disk when formatting a floppy.

Above 50M-byte fixed-disk capacity, the backup problem is as bad with 5M to 10M-byte removable cartridges as it used to be with 300K-byte floppy diskettes. Removable disk technology appears unable to keep pace with the evolution in fixed-disk technologies.

Perhaps in two or three years, research and development in optical storage technology will start yielding fruit in the 5¼-in. and below 5-in. envelopes. In the meantime, an increasingly demanding market for storage capacity wants an answer to the problems that exist now.

Users are once again faced with planning for their future needs with today's interim solutions. OA

Allen is present of Tallgrass Technologies Corp., in Kansas City, Kan.

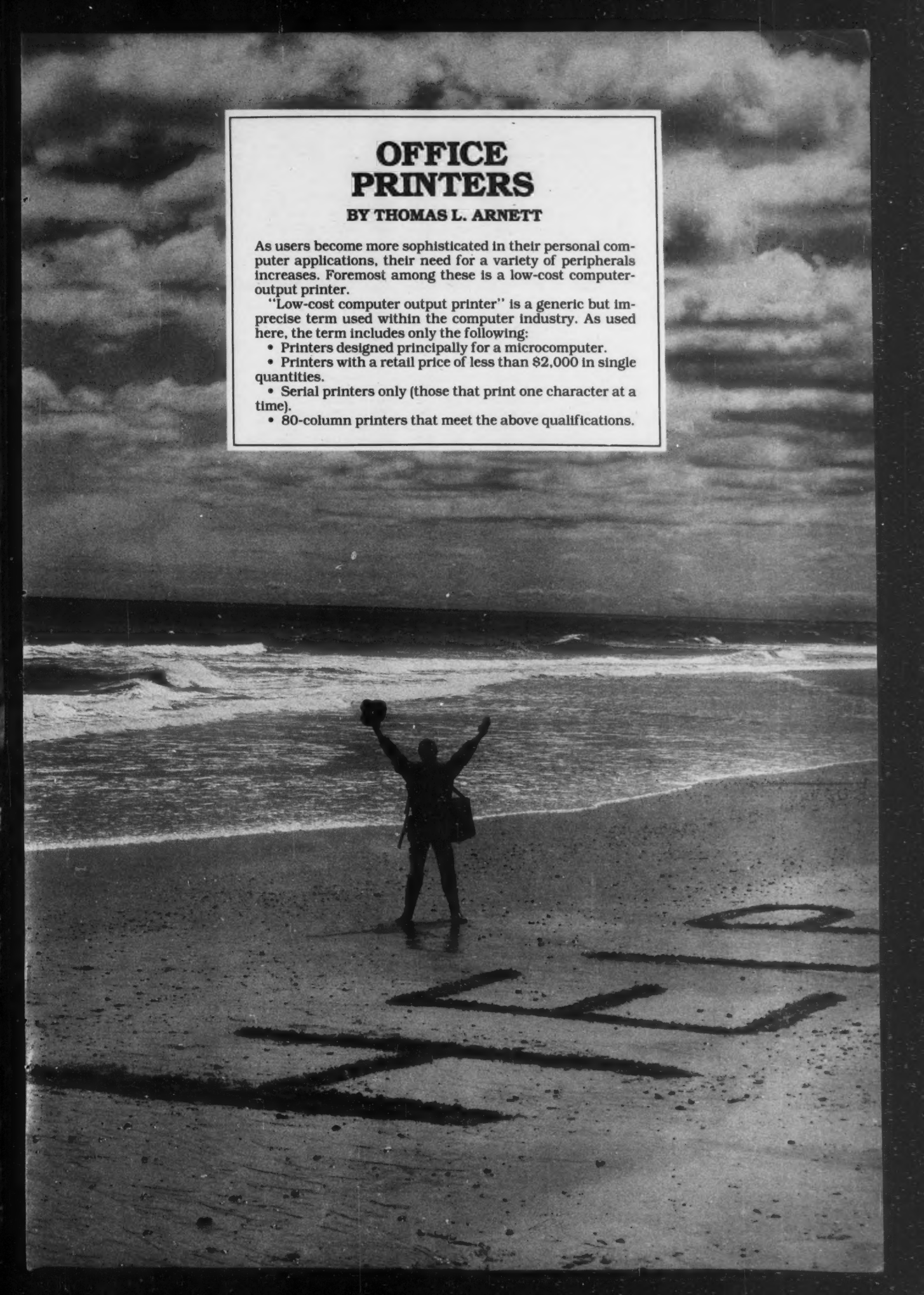


BACKUP

BY DAVID ALLEN

Data backup is generally not a major concern of personal computer users in the corporate environment — at least, not until they experience a disaster. Data loss caused by power failure, theft or accident can wipe out months of valuable work. Unfortunately, too few corporate personal computer users recognize that data security is indeed a major concern.

The mainframe world institutionalized backup. The day's work and updates are saved on tape and, sometimes, stored off-site. The benefit lies, of course, in the restoring of the data. With the proliferation of personal computers in



OFFICE PRINTERS

BY THOMAS L. ARNETT

As users become more sophisticated in their personal computer applications, their need for a variety of peripherals increases. Foremost among these is a low-cost computer-output printer.

"Low-cost computer output printer" is a generic but imprecise term used within the computer industry. As used here, the term includes only the following:

- Printers designed principally for a microcomputer.
- Printers with a retail price of less than $2,000 in single quantities.
- Serial printers only (those that print one character at a time).
- 80-column printers that meet the above qualifications.

The history of computer printers dates back to the earliest computers of more than 30 years ago. In contrast to the early start that included mostly serial impact and line impact printers, printers are now designed by means of more than 30 different technologies, each of which offers some unique engineering design or operating characteristic.

Since 1980, the number of vendors has grown from 26 (vendors of low-end printers under $1,000) to more than 100 (vendors of low-end printers under $2,000) at year-end 1983.

At their best, the earliest printers could not have begun to compete with even the cheapest and simplest of today's improved printers.

The history of low-end computer output printers can be specifically traced back to 1964, when the Shinshu Seiki Corp. of Japan introduced a small printer for use with Seiko timing devices in the 1964 Olympic games. The first truly low-cost printer was introduced into the U.S. market in the late 1970s; it was the I.D.S. Model IP125 serial dot matrix

printer. Not until 1980, however, did a truly useful business printer reach the marketplace in significant quantities at a retail price of less than $1,000.

The business market for microprinters is made up of users within large corporations, small businesses, government offices, educational institutions and the home. It is a truly international market: Printer products are manufactured in the U.S., Asia and Europe.

During the brief four-year period since that introduction, the number of vendors has grown from 26 (vendors of low-end printers under $1,000) to more than 100 (vendors of low-end printers under $2,000) at year-end 1983 (see Figure 1 on Page 56).

The number of models has also increased from approximately one per vendor in 1980 (25 in total) to four to five models per vendor brand in 1983; the latter total undoubtedly exceeds 400 to 500 different models and types — enough to provide a wide choice of devices for users' specific needs.

MIS managers and users should also be aware that during this same period, fully formed character printers have decreased in price from more than $3,000 for a 35 to 40 char./sec printer to less than $1,000 for printers that operate at 12 to 20 char./sec, thus fully qualifying for the first time for inclusion within the low-end category of printers.

The industry environment that surrounds the manufacture and sale of microprinters is one of the most dynamic subsegments of the entire computer industry. It is not easily characterized because several opposing forces operate simultaneously within this market. Among them are the following:

- New product entrants.
- Existing product upgrades.
- Performance improvements.
- Significant price/cost squeeze.
- Bankruptcies and major earnings reductions.
- Product/vendor proliferation.
- Technological innovation.
- Dramatic industry growth.
- Shifts in vendor position.
- Mergers and acquisitions.
- Changing distribution methods.

This, then, represents a highly changeable and rapidly developing marketplace and industry environment, one in which both vendors and buyers must be alert to significant product and competitive changes constantly taking place. Good advice for the first-time buyer is to stay with market leaders when acquiring the first printer.

The business market for microprinters is made up of users within large corporations, small businesses, government offices, educational institutions, as well as in the home. It is an international market in the truest of senses: Printer products are manufactured in the U.S., Asia and Europe.

As the market for microcomputers has expanded,

Vendor Types	No. of Vendors 1980	1983	% Growth
Dot Matrix Printers	17	60	252%
Full Character Printers	3	25	733%
Nonimpact Printers	6	25	316%

Figure 1. Vendor/Product Proliferation, 1980 to 1983

Factor	Solid Char.	Dot Matrix	Thermal
Cost	2-3	5	5
Speed	2	3-5	3
Print Quality	5	1-4	2-3
Reliability	2-4	3	3
Graphics	2	4	3
Color Potential	3	4	1
Paper Utilized	5	5	1
Supplies	3	3	2
Noise Level	1-2	2-4	3

Figure 2. Comparison of Printer Types

so has the market for microprinters. This growth, which has exceeded 100% annually for the past few years, will not continue at that dramatic pace. However, even under our most conservative and pessimistic forecast, buyers will sustain market growth in the range of 30% to 35% per annum. Under our more optimistic forecast, this growth could achieve rates in excess of 50% per year over the near term.

This combination of growth and previously mentioned technical innovation means today's buyer, when compared with a buyer of just three years ago, is getting an enormous bargain in terms of both price and performance.

The increase in microprinter usage lies in the fact that, as the potential user becomes better acquainted with the productivity value of the personal computer, he is more likely to become interested in acquiring one for practical business use. With prices for both microcomputers and microprinters decreasing, the purchase of a complete system becomes an inexpensive and financially nonthreatening decision for the typical business user.

In the larger corporate environment, a similar pattern of logic occurs in the procurement of multiple numbers of small systems. Twenty years ago, a major push occurred among corporate professionals to be established in private offices. Today, a similar push is occurring among the same type of corporate professional-level personnel to acquire a computer for personal or semipersonal use within the office. This is accompanied by a strong marketing effort on the part of personal computer vendors to convince the senior levels of management of the utility value of personal computer within the executive suite.

Three primary technologies are used to manufacture low-cost printers: impact dot matrix printers, fully-formed character printers and serial nonimpact printers.

In this market, for all practical purposes, the nonimpact printers also utilize dot matrix technology, although a newly emerging trend will see the evolution of an effective ink jet printer in the below-$500 retail price bracket. These printers will be capable of forming full characters, making them indistinguishable from daisy-wheel printers. Within these three groups, are subdivisions that are both performance-based and price-driven.

In each market, the principal subsegments are as follows:

- Serial dot matrix printers:
  - ☐ Under $500.
  - ☐ $500-$1,000.
  - ☐ $1,000-$2,000.
  - ☐ Multimode.
- Nonimpact printers:
  - ☐ Thermal.
  - ☐ Electrosensitive.
  - ☐ Electrostatic.
  - ☐ Ink jet.
- Fully-formed (solid-character) printers
  - ☐ Electronic typewriters, with computer interface.
  - ☐ Low-speed (less than 30 char./sec).
  - ☐ High-speed (more than 30 char./sec).

In the dot matrix category, the price differential is determined by extra performance characteristics, including buffer capacity, carriage width, commercial-quality performance, multispeed ability and heavy-duty features.

In the daisy-wheel category, speed translates quite directly to price. In the nonimpact category, the printer is usually a very low-cost item. However, this low price is generally offset by the higher price of the specialty papers required.

It is exceedingly difficult for the typical business person to make an objective comparison between printers offered by the different vendors. The first step in attempting such comparison should always be to define the type of print output that will satisfy the requirement. Will so-called draft quality suffice? If so, a low-cost dot matrix or nonimpact printer would be adequate.

If the requirement is for letter-quality printing, the only option that will be completely satisfactory will be the fully-formed character printer. The decision can then hinge on the volume of printing to be done. For minor levels of printing, the slow 12-to-15 char./sec printers are quite satisfactory. However, with any appreciable volume of printing, those printers would be too slow, making the 35-80 char./sec printers more effective.

The second consideration should be to examine specific ways in which the printer will be used. The specific print characteristics needed can then be used to help determine which printers will be satisfactory and which will not.

The following list highlights some of the important characteristics of Epson America, Inc.'s FX-80, one of the most popular low-end dot matrix printers currently sold for use with microcomputers.

- Speed: 160 char./sec.
- Dot-addressable graphics.
- Super/subscript printing.
- Selectable left/right margins.
- Selectable skip-over-perforation.
- Tabbing, horizontal and vertical.
- Tear-bar lid.
- Parallel-interface standard.
- Reverse line feed.
- Backspacing.
- Proportional spacing.
- Underlining.
- Selectable character sets.
- Eight international character sets.
- Adjustable pin-feed platen

In contrast, some of the major characteristics of Diablo Systems, Inc.'s Diablo 630 daisy-wheel printer — one of the work horses among the fully-formed character printers — are as follows:

- Interchangeable metal/plastic printwheels.
- Speed: Up to 30 char./sec.
- Selectable transmission rates 110 to 9,600 baud.
- Bidirectional printing.
- Friction platen.

PRINT CHARACTERISTICS
- Print Method.
- Character Format.
- Maximum Print Speed.
- Bidirectional/Logic Seeking.
- Printable Character Sets.
- Alternate Character Sets.
- Number of Columns.
- Pitch, Character Spacing, Char./In.
- Types of Paper Handled.
- Paper Width, Min/Max.
- Forms Thickness Adjustment.
- Paper Drive Type.
- Line-Feed Time.
- Paper Slew Rate.
- Color Printing.
- Ribbon Length.
- Ribbon Type.
- Paper Path/Feed.

PHYSICAL CHARACTERISTICS
- Dimensional Size (HxWxL).
- Weight (lbs).
- Portability.
- Footprint (LxW).
- Maximum Noise Level.
- Voltage.
- Power (watts).

KSR KEYBOARD CHARACTERISTICS
- Layout Type.
- Number of Keys.
- Numerical Keypad (cluster, #).
- Local, On-Line, Control.
- Shift, Reverse, Alpha Control.
- Character Repeat.
- Key Rollover.
- Escape Key/Break Key.

OPERATOR CONTROLS
- Top of Form Setting.
- Forms Length Setting.
- Character Space Setting.
- Auto Line Feed Setting.

INDICATORS
- Power ON/OFF.
- Carrier Detect.
- Transmission Error.
- Paper Out.
- Ribbon Out.
- Column Position.

COMMUNICATIONS
- Serial, RS-232C, Interface.
- Parallel Interface.
- Current Loop.
- Mode of Transmission.
- Transmission Rate (Baud).
- Parity Select.
- Receive Buffer Size.
- Line Control, X-On, X-Off.

SPECIAL FEATURES
- Audible Alarm.
- APL Character Set.
- Auto View, Last Character.
- Self-Test.
- Answer-Back.
- Built-In Modem.
- Full Graphics.
- Compressed Print.
- Expanded Print.
- Proportional Spacing.
- Horizontal Tabbing.
- Vertical Tabbing.
- Addressable Tabbing.
- Form Access.
- Microprocessor-Based.

Figure 3. Printer Characteristics

The Star of Team Xerox.

XEROX

The Star 8010 professional workstation has always been known as a computer of dazzling capabilities, especially in its graphics, information processing and document preparation.

Team Xerox

But what some people may not know is that the Star is also the key element in Team Xerox, a system of office machines designed to work together like a team.

When part of an Ethernet network, the Star can work with a wide array of word processors, mainframes, personal and business computers, printers, electronic mail and file services, facsimile terminals, communicating Memorywriters, other networks and, of course, other Stars. It also provides 3270 and TTY emulation.

Its full 17" bit-mapped screen lets you view two full pages simultaneously and open up to six documents at a time without covering up a previous document.

It's also the only workstation that can create and print documents in more than a dozen languages, including Russian and, for the first time, Japanese (Katakana, Hiragana and Kanji).

While other workstations may use Xerox innovations like the mouse, icons, windows, property sheets and combined text and graphics, the Star simply does more with them.

For example, the Star's extensive software is fully integrated, to allow you to work with text and graphics simultaneously. You can draw a flowchart right in the middle of a full page of text without having to resort to a separate program and limited buffer "scratchpad" or "clipboard."

In terms of capabilities, ease of use and overall value, the Star would have to be considered the stellar workstation in the industry.

Hours/Day	Business	Nonbusiness
Less than one	23.7%	40.7%
1 to 2	24.7	26.7
2 to 5	29.0	19.8
5 to 8	14.0	8.1
More than 8	8.6	4.7

Figure 4. Daily Operating Usage for Low-Cost Printers

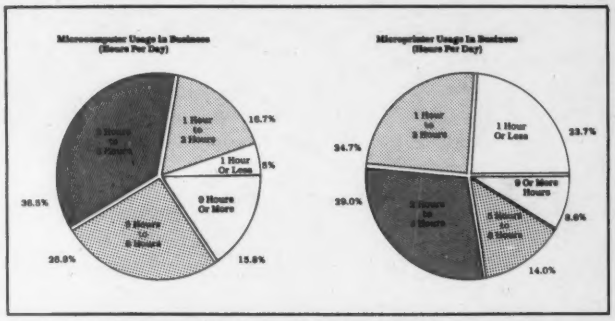


Figure 5: Microcomputer vs. Microprinter Usage

- Serial-interface standard.
- Ribbon-out, paper-out signal.
- Prints at 10, 12, 15 pitch or proportional spacing.
- Fully-formed-character print.
- 96 printable characters.
- Internal test diagnostics.
- Internal power supply.
- Snap-in ribbons (one or two colors).
- Small print buffer.
- Cover-open signal.

After the major print characteristics have been examined, attention can be given to such items as price, speed, reliability and so on. Figure 2, which is based upon a recent Arnett Associates survey for Frost & Sullivan, Inc., illustrates the relative attractiveness of the three types of low-end printers as measured against important purchase factors. The effective scale is that a rating of 5 is considered highly attractive, and a rating of 1 is very unattractive. Ratings of 2, 3 or 4 represent intermediate levels of desirability.

Figure 3 shows some printer characteristics that users should consider. All manufacturers rate and publish the operating speed of their printers, but buyers should be aware that this rating can sometimes be misleading. The ratings are determined under certain technical test conditions that may or may not be representative of individual conditions of use.

Types of documents printed can also have a major bearing on the total throughput of documents printed. Figure 6 below shows the relative speed of the same printer performing under four different levels of text quantity.

Of the more than 100 companies that manufacture and/or sell low-cost printers, far and away the majority of printers are purchased from a few top brands. For the most part, these brands have achieved the greatest rate of penetration because of a combination of reliability, performance and availability. Leading vendors for the two major types of printers currently in use are as follows:

Dot matrix printers

- Anadex, Inc.
- Epson America, Inc.
- IDS Corp.
- Mannesman/Tally Corp.
- Okidata Corp.
- Radio Shack Corp.
- TEC, Inc.

Solid-character

- Brother International Corp.
- Diablo Systems, Inc.
- C. Itoh Corp.
- NEC Informations Systems, Inc.
- Qume Corp.
- SCM Corp.

In the dot matrix market, Epson holds a commanding lead over all of the other manufacturers. This has been a result of both an active sales program to the computer retail stores and an active program to private label its printers for firms like IBM and Hewlett-Packard Co. In the full-character market, NEC and Diablo currently share the market lead. Radio Shack, which pioneered the low-cost nonimpact technology, is probably still the leading seller in the nonimpact market.

It was determined in the Frost & Sullivan survey that the typical office user actually uses his computer for an average of three different types of applications. Of these three applications, word processing was consistently and surprisingly ranked as the No. 1 application, with 72% of all users. (This means that the microcomputer is more frequently being used in lieu of stand-alone word processors in the smaller offices.)

The word processing application is followed closely by accounting and DP, with 64% of users. Other high-level applications reported were file management (55%), business analysis (48%) and engineering analysis (29%). It was interesting that 14% of the business users even admitted they use their small systems for playing games.

One final item to consider when acquiring a specific printer is the amount of time the printer will actually be in use. In the typical large-scale DP center, the printer is frequently used for as much as eight hours per shift. However, low-end printers are more often used as a convenience tool to print output from analyses, low-level letter correspondence and so on. However, the usage level is much lower for this type of printer within the office environment. Nevertheless, usage in the office substantially exceeds that in the non-business environment, as shown in Figure 4. Figure 5 is a comparison of microcomputer usage and microprinter usage.

There are many factors to consider in the purchase of a low-cost printer for use in the office. The prospective buyer should remember that today's microcomputer systems have two Achilles' heels. One is the disk storage (floppy disk, Winchester drive, tape storage, cassette). The other is the printer. Both of these are electromechanical devices with a potential for mechanical failure.

As a result, a general truism applies to the printers currently being offered: Price tends to equate performance and reliability. The cheaper the printer, the lighter the load factor it was designed to handle and the fewer functions it will offer.

Unless the office user is in a position to buy more than one unit — and therefore have a backup availability — reputation for product reliability and availability of repair should weigh as heavily in the purchase design as price and performance. OA

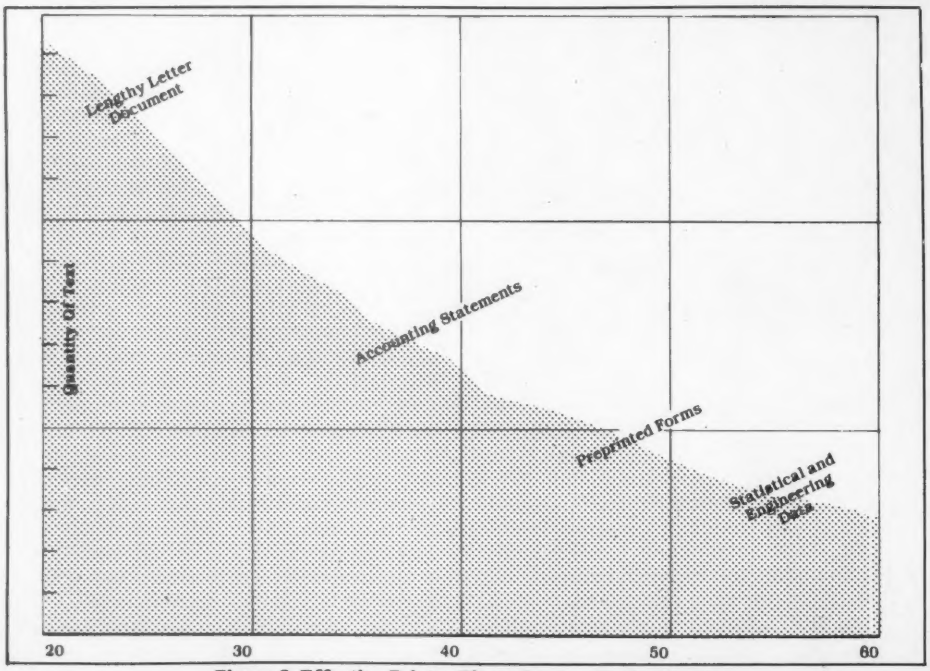


Figure 6: Effective Printer Throughput — By Application

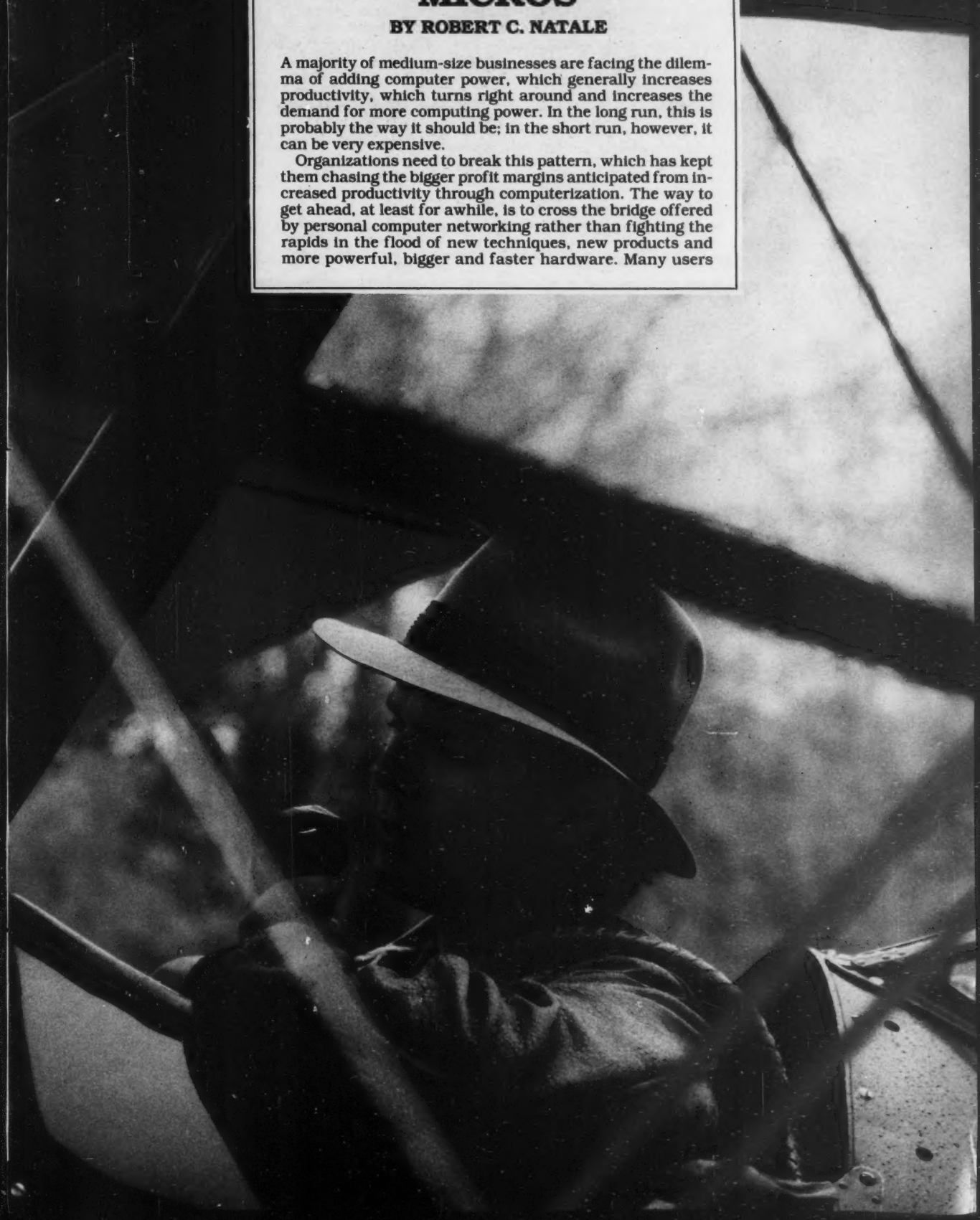
Arnett is president of Arnett Associates based in Los Altos, Calif., and is project director for the Frost & Sullivan, Inc. research firm.

NETWORKING MICROS

BY ROBERT C. NATALE

A majority of medium-size businesses are facing the dilemma of adding computer power, which generally increases productivity, which turns right around and increases the demand for more computing power. In the long run, this is probably the way it should be; in the short run, however, it can be very expensive.

Organizations need to break this pattern, which has kept them chasing the bigger profit margins anticipated from increased productivity through computerization. The way to get ahead, at least for awhile, is to cross the bridge offered by personal computer networking rather than fighting the rapids in the flood of new techniques, new products and more powerful, bigger and faster hardware. Many users



remain confused by the numerous communications technologies at their disposal. Frequently, the management information systems (MIS) person must educate them in the technologies that can be applied to their specific needs. This article can be considered a tool for that purpose.

Microcomputers will allow each worker to do more work in a shorter time and with more efficient use of shared resources than has been possible until now. But the work done will be of value only if it occurs in the context of the organization's overall mission: that is, in the context of common production and shared resources.

For example, it is generally more efficient for a secretary to work on a lengthy contract by using word processing software running on the secretary's own personal computer, with the text stored on the local mass storage device (disk or diskettes) of that personal computer, than to have that person work on the same document over a simple terminal connection to a connection to a central computer.

However, the secretary must then be able to access a high-speed printer on remote computer A to produce a draft copy. Then, after revisions have been made, access to a letter-quality printer on remote computer B is necessary to produce the final — original — copy. And after that, the WP supervisor should be able to archive the contract onto a mass storage device on remote computer C, and then delete it from the secretary's personal computer.

Personal computers can be made this productive through computer communications, especially in the areas of micro-to-mainframe linking, local-area networking and distributed data base processing.

Micro-to-mainframe link: Actually, this term is a misnomer. Micro-to-mini and micro-to-micro links are about as common as micro-to-mainframe links. In most cases, if nonidentical equipment and software are used on each end of the link, the same basic problems have to be dealt with to establish and utilize such links. This type of computer-to-computer communications can therefore be referred to as the intercomputer link.

Micro-to-mini and micro-to-micro links are about as common as micro-to-mainframe links. In most cases, if nonidentical equipment and software are used on each end of the link, establishing and utilizing such links will involve the same basic problems.

The fundamental characteristic of the link itself is a one-to-one physical connection between two computers during any given session. Typically, this physical link — also known as a circuit or channel — will be established by a cable running from a communications port on one computer to a communications port on another computer or by using the telephone network to replace the direct cable.

In the first case, the port on the remote computer is more or less dedicated to

the connection to the personal computer. In the latter case, it can be shared by multiple users, but it is dedicated to only one caller for the duration of his call.

In either case, the overall connection will have to satisfy a number of compatibility criteria.

One of the most fundamental criteria is the speed at which the communications interface in each computer expects the line to transmit and receive data. This speed, generally referred to as the baud rate, roughly corresponds to the amount of data (expressed as a number of bits per second) the circuit will handle. Because some transmitted bits are used for communications control, the number of data bits carried per second is lower than the actual baud rate.

One of the most fundamental criteria is the speed at which the communications interface in each computer expects the line to transmit and receive data. This speed roughly corresponds to the amount of data (expressed as bits per second) the circuit will handle.

Direct-connect circuits can generally handle all baud rates from 110 bit/sec to 19.2K bit/sec. Intercomputer links established via the telephone network normally handle line speeds of 1,200 baud or lower. Devices exist to permit utilization of the telephone network at higher speeds, but there is still an appreciable cost differential for such equipment.

Although 300-baud lines can be tolerable for truly personal computing — checking the local movie listings on your home computer, for example — business applications cannot be run profitably at that speed. Screen-oriented word processing software must run at 9,600 baud or greater to satisfy human interface requirements and to meet reasonable productivity goals in a real-world business environment. Efficiently written data entry programs can generally run as low as 1,200 baud without impeding productivity.

The communications ports, then, must be capable of supporting mutually compatible line speeds and those appropriate to the anticipated use of the line. This is also true for many other necessary attributes of the physical link.

Conversation formats can be either simplex (unidirectional) or duplex (bidirectional). Duplex lines can be either "On/Off . . . one-at-a-time" (half-duplex) or can support concurrent bidirectional (full-duplex) communications. Full-duplex support is normally required to stop a job — probably by typing some control character — while it is sending output from the central computer to your personal computer's video monitor.

Transmission formats can be either parallel (a whole character at a time, usually eight bits) or serial (one bit at a time). On a serial line, which is most commonly used for this kind of intercomputer link. Transmission can be either synchronous (characters arrive on a certain schedule) or asynchronous (characters arrive at random, as with people typing at a keyboard).

Serial, asynchronous transmission formats are usually required because

most personal computers support this type of interface. Many mainframe computers tend to favor parallel and synchronous interfaces, because they are generally more efficient.

Signal formats can be either digital (discrete, binary; only two values, On or Off, are recognized) or analog (wavelike, volume; the degree of intensity — modulation — of the signal determines the value). Most computers communicate with digital signals. The telephone network uses analog signals.

A common way to establish an intercomputer link is over the telephone network. To do this, you will need a device called a modem — a term derived from modulator/demodulator. Any communications port on either end of the intercomputer link must have a modem if that port is to transmit or receive data over the telephone system.

Modems are devices unto themselves with respect to certain of the characteristics, and they raise their own questions of compatibility requirements. Incompatible modems can render unworkable an otherwise compatible physical connection.

It is important to remember that different modulation formats are possible on analog circuits. The three most common are frequency modulation, amplitude modulation and phase modulation. Modems used to interface digital circuits to the telephone system all support frequency modulation and possibly phase modulation for higher speeds. Modems that interface to local-area networks might have to support different or even multiple modulation formats.

A communications protocol is a formal set of rules governing the format and relative timing of message exchanges between two communicating processes. These can range from relatively simple but very important electrical specifications (like RS-232C) that do most of their work at the hardware level, to very elaborate packet management specifications (like X.25) that do most of their work at the software level. Some day, even much higher level protocols will govern application-to-application messages, and packet-level protocols will be handled primarily in the hardware.

For most personal computer users at this time, concerns about protocols end with the establishment of the right kind of cable — for example, straight-through or null modem; the right combination of connectors; and setting each communications interface for the right number of data bits, start/stop bits, parity checking and baud rate.

The final compatibility criterion deals with the information code used to represent the messages carried on the line. An information code is similar in concept to a protocol, but is more basic or fundamental. Information codes primarily determine the rules for character formation; to a lesser extent, they govern message syntax and communications control procedures. An analogy is that information codes deal with letters, words and maybe phrases, and that higher level protocols deal with messages. The information code will determine how many bits are used to make a meaningful character; which bit patterns constitute meaningful characters and which constitute control codes; and which are meaningless. The most commonly used information code today is the American Standard Code for Information Interchange (Ascii), but you might occasionally have to deal with others; for example, the Ebcdic code is often used on IBM and other mainframes.

Devices — computers, terminals, modems and so on — that use different protocols or information codes must either operate in transparency mode (read-pass-all), not operating on the data they transmit or receive, or interface to the communications circuit via a protocol converter, which is a device that translates between protocols.

As you can see, establishing an intercomputer link is not necessarily a plug-in-and-talk proposition. And we have only touched the surface, as far as the line characteristics are concerned.

Software Considerations: Personal computers currently use intercomputer links in two ways: as remote terminal extensions of the other computer and as virtual terminal workstations. The goal is to have personal computers function as virtual workstations or better. The current reality, however, is that most of the time the intercomputer connections serve mainly to make the personal computer a remote terminal extension of a central or host computer.

When you use a personal computer as a remote terminal on another computer, you generally only add to the work load of that other computer. Your personal computer is just another terminal in competition with other users accessing that computer and

using its memory, disk space, processing cycles and other resources.

Typically, your personal computer does little or nothing useful during such a session. At best, it might provide some terminal emulation capabilities to allow you to resemble a special kind of terminal to the other computer.

You interact with the operating system (the supervisory software) of the other computer and run applications resident on the other computer. When it is used as a remote terminal, the personal computer's resources, which are often formidable in comparison with those offered by the other computer, do not contribute to the work.

The real payoff for intercomputer links using personal computers will come when the personal computers function as virtual terminal workstations, offloading some of the work normally done on the central computer.

In this case, "virtual terminal" signifies that, although a connection exists between the two computers, it is used primarily for occasional data program-to-program data transfers rather than for end-user interaction with the central computer. Vis-a-vis the personal computer, the central computer's resources are used primarily to send and receive data over the communications link and to retrieve and store that data. Processing of the data is done on the personal computer.

An example of the difference between the two forms of personal computer utilization of an intercomputer link can be seen in the various software products (which are available for most personal computer operating systems) that perform file transfers over such connections.

With this kind of product, the personal computer user must normally first open a file on one of the personal computer's mass storage devices. The user then accesses the central computer as a remote terminal and executes the appropriate operating system commands on that computer to cause it to type a file to the video screen. In this phase, the resources of the central computer are used to interpret and validate the user's commands, perform applicable security checks, locate the requested file on its mass storage devices, read it into memory and output it to the communications port and, therefore, to the user's terminal.

The resources of the personal computer are also being used by the file transfer program, however, to capture the data as it comes over the personal computer's communication port and to store it in the file opened prior to initiation of the transfer. The user can then log off the central computer and use applications resident on his personal computer — word processing, data base management, graphics or spreadsheet software — to process the transferred data. The same basic procedure will be used in reverse to restore the file on the original computer if any modifications have been made.

Although this kind of processing represents a major improvement over the remote terminal extension mode of operation, more can be expected from current technology. In addition, it is frequently not enough to be useful to most real-world applications. Fundamental difficulties with many of these file transfer products emanate from their inability to handle the wide variety of data protocols which can derive from combinations of multiple operating systems and terminal devices. Control characters such as tabs, form feeds, line feeds and carriage returns are stored and interpreted in different ways by different operating systems and devices. This can result in unusable data or, at best, files that need extensive re-editing.

Furthermore, most of these packages can transfer text files only in this manner. Most business applications use data files containing information formatted in ways (data types) not representable as text — for example, within the Ascii information code.

A way around this is sometimes provided by requiring special software to reside and run simultaneously on both computers to effect transfers of binary data. When available, such software is usually limited to a certain type of hardware or a specific operating system on a certain type of hardware.

The development and installation of applications servers on the central computers represents another step toward realization of the virtual terminal workstation mode of utilization of personal computers in intercomputer links. These servers are special applications similar to device drivers; they lie dormant most of the time, not using significant system resources, until an application running on the personal computer makes a request for data or needs to send data to be filed on the central computer's mass storage or forwards to some other application running on the central computer.

Such applications can probably make good use of the central computer's data storage facilities and data managment software. But such applications will come only with very substantial development costs and lead times; the intercomputer link itself will still be a major source of complexity, cost and limited throughput.

Fundamental difficulties exist with many file transfer products because of the wide variety of data protocols that can become necessary. Control characters such as tabs, form feeds, line feeds and carriage returns are stored and interpreted in different ways by different operating systems and devices. This can result in unusable data or files that need extensive editing.

All the above problems and limitations can be multiplied by the number of potential interconnections an organization would like to have among its computers and peripheral devices. For the average medium-size U.S. business, this number can be expected to increase dramatically by the end of this decade.

And that brings us to the topic of local-area networks.

Local area networks: In its broadest sense, the term "local-area network" refers to a combination of communications hardware and software components. These components are designed to facilitate the connection of multiple dissimilar computers and devices for:

- ☐ Cooperative processing.
- ☐ Sharing of expensive and often inefficiently used peripherals and I/O devices.
- ☐ High-speed and high-volume data transfers.
- ☐ Greater integration of all aspects of DP (data base management, word processing, statistics, graphics, modeling, electronic mail and so on).
- ☐ Flexible user access to distributed data.

This is certainly a tall order, but the potential payoff in increased productivity and lower eventual costs is equally impressive. Local-area network technology promises specific cost savings with respect to terminals and cables, the need for front-end processors and in minimizing the impact of office relocations and changes to the overall configuration. It also promises greater compatibility among the various hardware and software components in a configuration and the ability to accommodate future growth in required capacity and new services with no or minimal modifications to the underlying network. In addition, this technology offers greater overall integration of equipment, applications, systems and technologies.

All this increased accessibility and flexibility can come with a net gain in the organization's overall control of computer resources. Best of all, local-area technology appears to be at a point where these goals are now realistic. No longer is the question, "Should a medium-size business with several computers and multiple workstations invest in a local-area network?" Now the question is how that business starts to plan, purchase and implement a local-area net.

The question is critical to the achievement of mid-term (five-year to 10-year) viability goals for forward-looking medium-size businesses. So much so that it warrants the caveat, "You should consult your tax lawyer for definitive guidance."

In other words, local-area technology is a rapidly developing field; customizing commercial networks to specific end-user environments is becoming the modus operandi of local-area installers. You will need to contract with full-service computer communications experts to ensure success in local-area network planning, purchase and implementation. Nonetheless, it is possible to outline some of the major features and pitfalls.

The essential feature of local-area network technology is a common medium over which all devices communicate. Today, this is a physical medium, a form of cable, whether twisted pair, coaxial or fiber optic. All devices connect to the cable (or bus) through special modem-like devices known as bus interface units (BIUs). The primary function of the BIUs is to convert the device-specific protocols into the cable bus protocol and vice versa. Although a lot more should be said about the how and why of this approach, it helps to try to visualize the general simplification of the overall device-to-device communications problems which results from having the common bus protocol as a tool.

Local-area nets can be differentiated according to various criteria. One of the most obvious is topology, the geometric arrangement of links and nodes in a network.

A node is an end point of any branch of a network or junction common to two or more branches. Nodes are usually intelligent user-oriented and application-oriented devices: computers, intelligent terminals, personal computer workstations and special network servers which handle spooled printing, file management and multiplexing of dumb devices; select transmission routes; and

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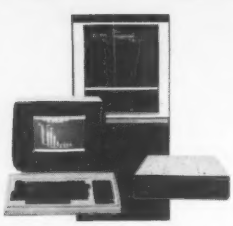

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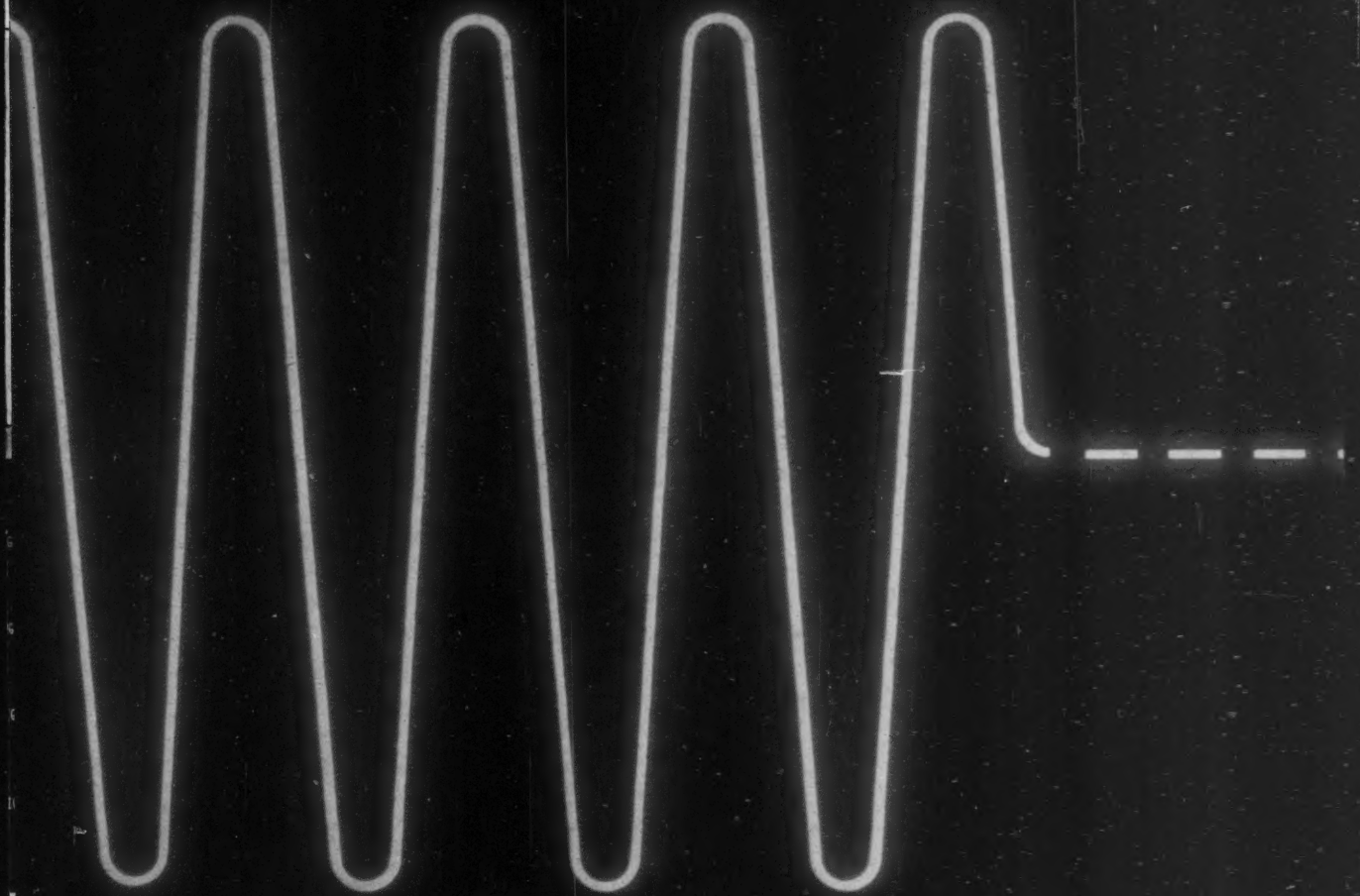

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provide gateways to networks using other protocols.

A link is a communication path (channel or circuit) between two nodes. As opposed to the direct intercomputer link described above, a local-area link is almost always a virtual circuit, established just for the duration of the call; the process is similar to what happens when you make a telephone call. A derivative aspect of topology is connectivity — the degree of direct node-to-node communications provided.

A general categorization of topologies separates them into two categories: point-to-point and multipoint. The former are topologies in which a given node can communicate directly only with other nodes to which it has a direct physical connection.

Examples of point-to-point topologies are the star, ring and loop configurations. Each of these topologies can form the basis of a high-performance network if all nodes use the same protocol and, preferably, the same operating system software. When these latter criteria cannot be met (and in future that will be the case more often than not), the disadvantages of the point-to-point design outweigh the possible throughput advantages.

Multipoint topologies are those in which a given node can communicate with multiple other nodes — usually all other nodes — connected to the network.

The most common implementation of multipoint topology today is the cable bus configuration. The bus topology is one in which all nodes share a single physical medium via cable taps or connections (BIUs); it provides a fully connected shared medium. In a bus topology, each node recognizes its own address and ignores messages intended for all other nodes. It has a very high level of immunity to single-point failures, and it usually requires network management software to perform fault detection and isolation.

Most major local-area products being installed today utilize bus topologies. Within this group, differentiation occurs primarily according to whether a given product utilizes baseband or broadband cable technology. Baseband technology (typified by Ethernet) is optimized for data transfers — what most networking is currently all about.

Broadband technologies can combine data, voice and video on the same cable. Significantly broad applications markets for networks carrying video and voice along with data have yet to be maintained. Some local-area architectures allow for a combination of baseband and broadband technologies.

Cost is a necessary purchase criterion, but it looks like local-area networks are going to be with us for a long time to come. If you can afford it, it is probably well worth investing in a system that promises greater opportunities for future growth — both with regard to internal network capabilities and the need to interact with external networks.

As emphasized earlier, you will not learn even a fraction of what you need to know to make intelligent local-area network planning, purchasing and implementation decisions without expert assistance. Nevertheless, you can become aware now of the major evaluation criteria. The following list, while probably not exhaustive, includes the most important:

- High-speed: Bus local-areas can commonly handle communications speeds as high as 10M baud (1M baud equals 1M bit/sec) for baseband designs and 2M baud for broadband designs.
- Wide bandwidth: This feature relates to the number of virtual circuits a network can handle simultaneously. Modern bus local-area networks typically provide hundreds and even thousands of such channels.
- Simple design: The hallmark of good engineering is simplicity of design. Complex problems often require complex solutions, but basic network design technology has reached a good point. A good rule of thumb is that an intelligent person, reasonably conversant with terminology and basic concepts, should be able to understand the underlying design of his network if it is correctly and clearly explained.
- Reliability and maintainability: The degree to which a network will be reliable and easily maintained will depend to some extent on the simplicity or complexity of the network design (the simpler, the better). It will also depend on the availability of off-the-shelf hardware components and third-party maintenance services, as well as the degree of modularity in the system and the adherence to standards.
- Flexibility and extendability: Changes to the network configuration — adding or deleting nodes — should be possible without major reworking; gateways to foreign networks should be available (or at least possible) as should bridges to additional segments of a given network.
- Cost: Naturally, cost is a necessary purchase criterion. But it must be re-emphasized that at this time it looks like local-area networks are going to be with us for a long time to come. If you can afford it, it is probably well worth investing in a system that promises greater opportunities for future growth — both with regard to internal network capabilities (more users, heavier volume, higher speeds and so on) and with regard to the probable need to interact with external networks.

Personal computers will really contribute in a significant way to an increase in work place productivity only if they are an integral part of the total computing resources of each organization. This integration of all computing resources within an organization can occur only through increased communications capabilities.

Personal computers can communicate with other computing resources in several ways. Two of the most prominent are intercomputer links (direct connections or over the telephone network) and local-area networks.

Although intercomputer links can boast a much lower entry price, over the long run they will tend to incur incremental costs; most important, they will not realize the potential productivity gains possible through greater computer integration.

Local-area networks bear a much higher entry price, but they will tend to pay for themselves over time. This will be especially true as the technology becomes more widely installed and utilized.

In either case, software capabilities lag far behind hardware capabilities and will possibly remain a major deterrent to full or even appreciable realization of the potential gains possible from greater computer integration through increased communications capabilities.

Nonetheless, now is the time when most U.S. businesses should be choosing a strategy to integrate personal computer workstations into their computing resources. Successful companies in 1990 will already have a fully functioning integrated computing environment in place. That environment will be the most prominent feature of the work place, determining work flow patterns and setting levels of expected performance for workers and managers alike. OA

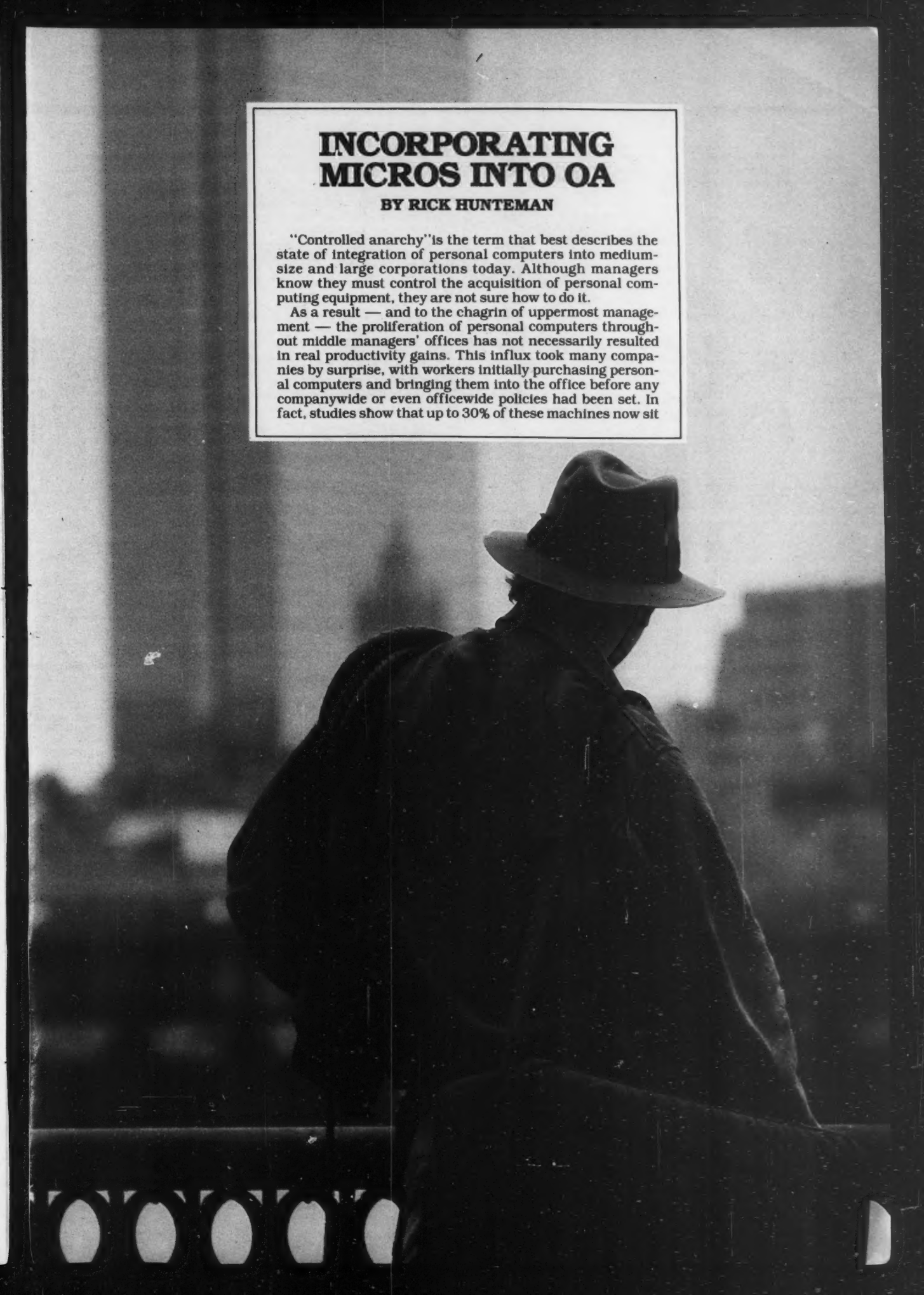
Natale is software and systems division manager for Contel Information Systems, Inc., based in Bethesda, Md.

INCORPORATING MICROS INTO OA

BY RICK HUNTEMAN

"Controlled anarchy" is the term that best describes the state of integration of personal computers into medium-size and large corporations today. Although managers know they must control the acquisition of personal computing equipment, they are not sure how to do it.

As a result — and to the chagrin of uppermost management — the proliferation of personal computers throughout middle managers' offices has not necessarily resulted in real productivity gains. This influx took many companies by surprise, with workers initially purchasing personal computers and bringing them into the office before any companywide or even officewide policies had been set. In fact, studies show that up to 30% of these machines now sit



idle in managers' offices. The reasons for this dilemma are numerous, but the primary problem is that the personal computer does not communicate easily with other people or products in many existing work environments.

This forces many personal computer owners to spend more time and energy trying to establish hookups to corporate computers, word processors and existing application programs than they spend in processing and communicating information — which is, after all, the real purpose of computing.

In applications like budgeting, personal computers are extremely helpful for the individual professionals they serve. Nevertheless, without companywide coordination, users risk spending more time thinking about issues of compatibility, computer services and training than about their own business concerns.

A need for strategy: Some corporations have tried dealing with their incompatibility problems with a simplistic hardware approach. Many larger companies are now recommending — indeed, mandating — that their managers buy equipment from a single hardware vendor or, minimally, a limited list of hardware vendors. Although this policy addresses the problem of incompatibility in the short term, locking into a single product or vendor is no guarantee that present or future office automation techniques will be either available or cost-effective for long-term applications.

Nor does it consider the changing relationships among and between people — professionals, managers and secretaries — who run the machines. These people frequently require different types of hardware to accomplish their tasks. For example, a typewriter is a better choice than a personal computer for filling in forms, just as a word processor is better suited to processing long documents or repetitive letters.

An OA strategy should take into account all aspects of office computing and communications, not just the integration of newly arrived personal computers. Personal computers should integrate into existing computing environments as fully as possible, not vice versa.

To be effective, OA should mirror office application priorities and concepts closely. It should begin with the workers and their applications and should follow their communications needs and opportunities through to software and, finally, hardware selection.

The OA strategy should begin with the assumption that all office machines are intended to make life as easy as possible for the people who run them and whose jobs they support. The users should have the most effective machines for their own local applications, plus any communications services deemed helpful for communicating with other departments, companies or networks.

Yet even with the sophistication available in data communications technologies today, the best form of communication in most offices is the written word. The primary office computing priority should therefore typically go to the production word processing equipment, including peripherals, copiers and, probably, telephone hookups to other department or remote-site word processors.

Not all company operators or departments need identical word processors, however. The OA strategy should take into account what degrees of centralization and compatibility are most acceptable. For example, should production word processor standards be set on a companywide or departmentwide basis?

Currently popular personal computer applications typically involve one or more of six major func-

tions: word processing, spreadsheets, graphs, data base processing, communications and so-called personal services like electronic mail and calendaring. Each user's software should be able to process these basic application types in a way best suited to overall office productivity objectives.

Any of these can be performed in stand-alone fashion, but the power and efficiency of each is greatly improved when communications are established with other office systems — typewriters, word processors, local-area networks and host computers.

Word and spreadsheet processing in particular can benefit by close compatibility with existing office WP and host computer systems.

Of these applications, word and spreadsheet processing in particular can benefit by close compatibility with existing office word processing and host computer systems. Not only does this save significant time and costs of extra keystroking, but it fosters the growing work-center structure central to the evolution of modern office processing.

For office computing systems to be most useful, they must adapt and adhere to the new work-center concepts. In most cases, for instance, multiple professionals share a single secretary, who in turn is supported by other office personnel — clerks and traffic managers responsible for a variety of duties.

More highly evolved office processing systems are those that put some functions closer to the creative source. The manager can create spreadsheets, memos and rough drafts personally, then give the secretary the electronically captured information, either through communications or direct disk-to-disk information transfers. The secretary reviews the work for spelling and grammar, then formats the information, develops the final copy and forwards the information to its destination.

This kind of role reversal is now possible because of the compatibility potential of personal computers with office or industrial word processing systems. Without a compatible personal computer, the professional or middle manager must create a handwritten draft, then give it to the secretary for keystroking into the word processor.

Because of typical secretarial work loads, a day or more may elapse before the rough copy comes back to the professional for editing and several more days before the information is distributed. With a compatible personal computer, that time is eliminated entirely; just as important, the secretary's skills are not wasted on redundant keystroking.

Improving creative skills: For the professional, being able to create original input gives a greater degree of control over the creative process. This pays off in better conceptualization of the finished product and typically results in higher quality written presentations.

Better yet, it improves interactivity within the office. The professional user can put that day-or-two turnaround time needed for manual preparation to use improving personal decision making — in budgeting, for example, where the user can take more

time to accommodate last-minute changes in budget variables. Improvements in office interactivity can be made on the mainframe side of the personal computer, with the installation of a micro-link software package.

Again, the user — the accounting, marketing or technical professional — can save precious hours by getting closer to appropriate information, typically in the general-ledger files of the mainframe. But it is important that micro-mainframe and other PC communications links that go outside the user's work center should fit compatibly within company standards and centralized control systems.

Inside the user's work center, personal-computer-to-word-processor compatibility also enables secretarial skills to be put to better use — editing, formatting and making additional creative judgments, instead of rough keystroking the copy of multiple managers and professionals. The result is higher quality information that reaches its destination in a fraction of the time traditionally required.

It is obvious that disk-to-disk compatibility between the personal computer and the secretarial word processor is the ideal; it eliminates communications processing and CPU time. However, only a few hardware vendors currently offer this option. The next level of compatibility is through communications — to do that, the personal computer should be compatible with architectures of popular word processors and network technologies.

To further aid work-center productivity, personal computers should make use of existing standards in products — and centralization of control policies — as much as possible. By supporting popular operating systems such as Digital Research, Inc.'s CP/M and Microsoft Corp.'s MS-DOS, personal computers can give professionals access to the most widely used applications — Micropro International Corp.'s Wordstar for word processing, for example, and Microsoft's Multiplan for spreadsheet calculations. In addition, application versatility is becoming increasingly valuable in work relationships among personal computer owners — a trend that will accelerate in the future.

The challenge of freedom: Future standards will encompass communications architectures and graphics techniques as well as operating systems. Already considered de facto standards are RS-232 for low-speed communications and Ethernet for higher speed local-area networking. As office networks grow in scope and processing power in the future, these and other forms of standardization will promote greater freedom of hardware and software choices for those bringing micros into the office.

But with freedom comes a challenge. As personal computer technologies proliferate, companies will have to organize their in-house computer configurations to mirror interdepartment operations and to satisfy corporate needs. Just as personal computers should fit cleanly into existing office work environments, companywide computer and communications systems should fit into the corporate environment — philosophically, architecturally and economically.

Therefore, rather than losing territory to personal computers, DP management will find it critical to coordinate and maintain the workings of companywide personal computer networks and applications. Likewise, the communications manager will strive to centralize and coordinate the predictable increases in communications outside the building — and among remote sites — which will be necessary for electronic mail and other personal computer communications.

Until then, company management should take care not to lock itself and its office operations into a single hardware vendor that may not run the needed applications or, worse yet, into a unique operating system or hardware design that will take away the versatility of and compatibility with available hardware and software products. **OA**

Rather than losing territory to micros, DP management will find it critical to coordinate and maintain the workings of company-wide micro networks and applications.

Hunteman is manager of personal computer marketing at Xerox Corp.

PHOTO © 1984 ED BRAVERMAN

AUTOMATED FACTORY, AUTOMATED OFFICE

BY ANDREW MESSINA

In the future, the best features of the two will merge. What role will the MIS manager play?

United States manufacturers are planning to spend billions of dollars over the next decade on robots, computer-aided design and engineeringsystems, automated materials-handling devices, distributed process control and computer-based factory planning systems. These intelligent systems not only will improve the competitive position of manufacturing in this country, they will also irrevocably change the traditional concept and characteristics of the factory. At the same time, another phenomenon is occurring in the traditional office and service segments of U.S. businesses. Many office operations are being transformed into discrete work steps that can be measured, monitored and made more productive through automation.

The result is a blurring of traditional boundaries between the factory and the office and the beginnings of a new business in the form of an integrated operation. In this environment, all functional areas of a manufacturing company — regardless of their previous office or factory identity — may be organized around a centralized corporate network.

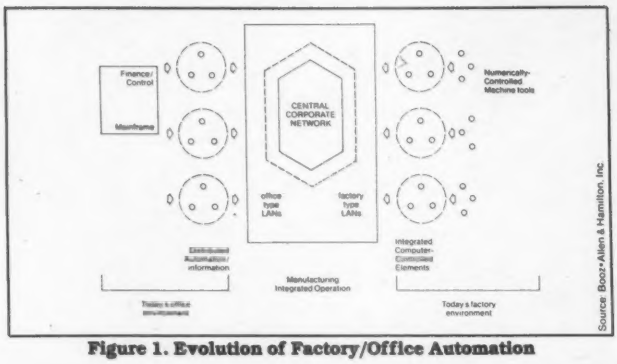


Figure 1. Evolution of Factory/Office Automation

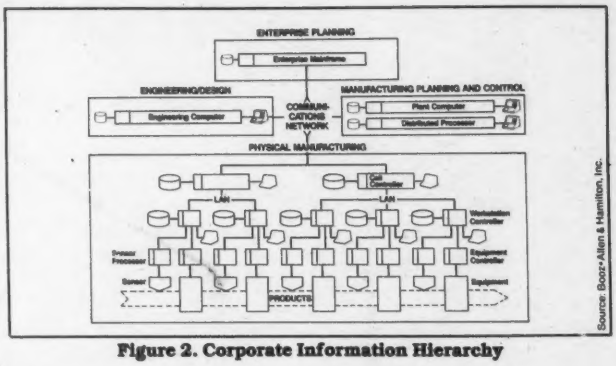


Figure 2. Corporate Information Hierarchy

These developments raise several interesting questions:

- What is the interrelationship, if any, between the factory of the future and the office of the future and how will it develop?
- What factory-of-the-future technologies, concepts and analytical tools and techniques can be applied to the office environment? What elements of office automation can be adapted to the factory environment?
- What is the role of the management information systems/data processing professional in planning and implementing in manufacturing corporations? Should he be the leader, technical adviser, interested observer or bystander?

Based on studies by Booz, Allen & Hamilton and others, the factory of the future will be characterized by three major changes.

First, a significant portion of the human labor and fixed automation of today's factories will be replaced by flexible automation with embedded intelligence.

Second, large-scale information networks and shared data bases will develop that will permit a high degree of integration within and among the major elements of the factory (enterprise planning, engineering and design, manufacturing planning and control, and physical manufacturing). Concurrently, the proliferation of intelligent systems throughout the factory will allow functional management decisions to be performed at lower levels of the manufacturing hierarchy.

The third major change will be the widespread use of factory operations modeling and simulation as a day-to-day management tool in planning and operating the factory of the future.

Although office automation started from a centralized computer-based finance and control function and factory automation started from decentralized simple automation of machine tools, the evolution toward future office and factory configurations has been surprisingly similar. Each major trend noted above for the factory of the future has parallels in the office of the future: flexible workstations with embedded intelligence, large-scale information networks coexisting with distributed end-user control and the use of modeling and simulation to allow "what-if" options for enterprise planning. Indeed, the two worlds are merging in the integrated operation of the future (See Figure 1).

More specifically, the organization of a future manufacturing

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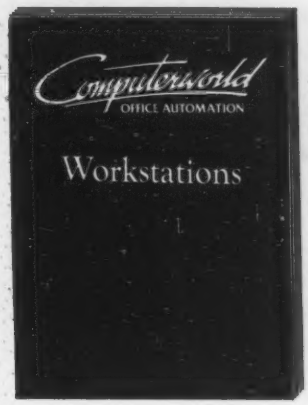

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corporation will be structured as an information hierarchy around a communications network (see Figure 2 on Page 72).

In this arrangement, the traditional office functions will encompass enterprise planning, marketing, manufacturing planning and control; the traditional factory functions will exist at the physical manufacturing level.

This blending of office and factory responsibilities can also be seen in hardware. The "top three" functions require mostly generic automation hardware such as various computers, terminals and communications networks.

Such hardware is virtually interchangeable among functions and among industries. The real hardware differentiation is in the physical manufacturing area.

Remote control and telecommunications capabilities may remove the factory worker of the future from even proximate location to the machine tools and processers under his control.

Within this broad framework of the future integrated operation, what are the near-term implications?

The work environment of factory workers will become more like that of office workers.

The factory of the future will be a computer-intensive and information-intensive facility with a highly skilled work force. It will still contain a number of noisy, dirty and hazardous processes, but the degree of automation will reduce the need for human operaters to physically share these areas.

Over time, it is reasonable to expect that the factory will evolve into a mix of machine-dominated and people-dominated spaces. The Japanese clearly foresee this change and have postulated glass-enclosed, air-conditioned, sound-protected worker stations in their vision of the factory of the future.

As this trend evolves, one of our primary historic distinctions between the factory and the office will disappear. As a further step in this direction, remote control and telecommunications capabilities may remove the factory worker of the future from even proximate location to the machine tools and processers under his control.

At this point, the production supervisor, salesman/engineer, designer and marketing manager will share the same office environment.

The nature of factory work will shift from blue collar to white collar. Concurrently, many traditional office/service type tasks will become industrialized.

Just as the physical environment of production facilities is changing, the very nature of factory work will change.

The production worker/supervisor of the future will spend more time developing application software for automated tools and systems, analyzing production system performance and monitoring a variety of automated systems. The factory worker of the future will spend more time at a computer terminal or specialized graphics-based workstation.

As sophisticated robots and control systems replace assembly line workers and operaters, the ratio of white-collar to blue-collar jobs will change, while the skill and training requirements for factory workers will shift from manual and craft-related to technical and analysis-related.

Meanwhile in the office, many of the more routine clerical and production tasks will be industrialized in order to achieve improved productivity, reduced costs and improved quality and consistency.

Two recently cited examples of this trend in the service sector include the processing of insurance claims and the preparation and packaging of fast food. In manufacturing companies, similar office functions, such as order fulfillment and technical documentation, are being industrialized into discrete, defined work steps or products so they can benefit from traditional assembly-line techniques.

Other traditional factory management techniques such as work sampling and measurement, process flow design, and operations research — when optimized through the use of information systems — have enormous potential for improving the office of the future. In order to measure the productivity improvements achieved for the Air Force through OA, for example, a product approach methodology has been developed that defines discrete

office and management tasks in terms of products similar to the production output of a factory.

The bottom line is that the integrated operation of the future will incorporate the best features of today's offices and factories.

Shared data bases are driving the near-term integration between factory and office functions.

Both horizontal integration across functional areas and vertical integration from the boardroom to the factory floor will increase steadily and dramatically in the near term.

One of the driving forces in this direction is the development of shared production data bases. In the early stages of office and factory automation, the thrust has been the development of data bases within functional areas — design or inventory. Within the next few years, these separate data bases will be replaced by shared data base systems.

Computer-aided design systems will share a product design data base with technical publications, manufacturing design and engineering. The manufacturing planning group will share a production requirements data base with the sales department as well as the finance and control function.

As the level of integration increases, traditional boundaries between functions and between direct and indirect cost elements will dissolve. A new organization structure organized around the centralized corporate network and based on common information access and control requirements will emerge and will further blur the boundaries between the factory and the office.

The procurement and management of systems will become a centralized corporate priority and will provide a major opportunity for the MIS/DP professional.

There is a current dispersion and proliferation of automation and information systems (again, see Figure 1 on Page 72) — both in the office and the factory. While this trend toward a computer on every desk and a terminal on every machine will continue as automation becomes even more widespread, the procurement and management of these computers will revert to centralization.

Currently, we are at a watershed in terms of integration. The costs of hardware and software, combined with the potential of integration to reduce or even eliminate many steps now necessary to do business, make it imperative to consolidate information systems within a corporation — even an entire industry.

For example, computer-aided engineering systems will require word processing features in order to handle documentation and technical publications. Materials management systems will need sophisticated spreadsheet functions in order to determine the cost implications of inventory and materials decisions. Throughout the corporation, managers will be looking to integration to give their systems the added features that a single department could not afford.

A new organization structure organized around the centralized corporate network and based on common information access and control requirements will emerge and will further blur the boundaries between the factory and the office.

Because the proliferation of incompatible hardware and software will not reconcile with the integrated operation of the future, selection and integration of information systems will become a corporate-level strategic responsibility.

This portends an enormous opportunity for the MIS/DP manager. In a manufacturing company, that person will need to focus and extend skills to encompass the information needs of the factory of the future: computer-aided design, engineering, testing, process control, materials management and the like.

The MIS professional who not only responds to this challenge, but also leads his company in the direction of the operation of the future by facilitating integration among factory and office functions, will clearly have top management responsibility. OA

Messina is a vice-president and director of Booz, Allen & Hamilton, Inc. and directs Booz, Allen's work in manufacturing and office technologies.

A VOICE IN THE WILDERNESS

BY THOMAS R. ELLIOTT

When people look back at the rosy predictions made in the late 1970s for office automation, one question leaps to mind: "Why didn't it happen that way?" Why, in 1984, don't we all work happily and productively in paperless (or near-paperless) offices?

One reason sometimes advanced is that OA technologies have never dealt effectively with the most basic form of human communication — the voice. If the ease with which we speak to each other could have been incorporated in the electronic office, the great day would have dawned some time ago.

Several advantages of voice communications are offered as part of this argument. The first is that voice is a very natural way to communicate. True, we do have to learn to speak, but most of us accomplish that at a very early age — and not on company time, either. This is not the case with most computer-based ways of communicating.

Furthermore, we are almost universally familiar with the basic electronic instrument of voice communication: the telephone. Again, basic telephone skill training comes early; adult workers may have to be taught a few private branch exchange (PBX) features, but everybody knows what a dial tone means. In addition, telephones are virtually everywhere, a fact which is used in conjunction with the frequently posited keyboard phobia of managers and professionals to argue that the telephone is the terminal of choice in the office, if only it could be given the functionality of character-oriented terminals.

If all this is true, then the full

KATHERINE MAHONEY

flowering of OA awaits the development of highly functional and cost-effective voice processing technologies.

But if blaming everything on inadequate or expensive voice technologies is not a very convincing argument, it nevertheless contains some truth. Most OA developments have come from a text or DP background. Voice processing has not been a mainstream activity, despite the fact that most office information flow is verbal.

Renewed interest in voice technologies has surfaced recently and there is some reason to think effective integration of voice processing into OA in general is closer to being a reality.

One key voice technology that is the subject of some current interest is voice mail, or voice store-and-forward. Voice mail is essentially the use of a computer to digitize and store voice messages and route them through the telephone network to their recipients. When the input is digitized, voice mail systems look very similar to computer-based electronic mail systems; the major exception is that the terminal is a telephone instrument.

Although individual products vary in design detail, most voice mail systems work in roughly the same way. The voice input is digitized by sampling the analog wave form at periodic intervals and recording the values as a series of digital impulses. To the digitized message is appended information about the sender, the recipient, desired level of security, return receipt requested and so on. This information is entered from the sender's telephone instrument, using the touchpad to generate the appropriate codes. A central computer stores the message and delivers it as instructed.

Voice mail systems can also be used as answering machines. A user who is going to be away from his desk can direct incoming calls to the voice mail system; callers are requested to leave messages, sometimes by a personalized announcement, depending on the sophistication of the system. Indeed, the fact that voice mail systems can be used this way may be partially to blame for their relative lack of acceptance. A skeptical manager, looking only at the issue of message-taking, might very well conclude that everyone in an office could be equipped with a reasonable tape answering machine for less than the per-user cost of a voice mail system.

As prices decline and integration with other office technologies like computer-based electronic mail systems becomes more practical, voice mail should play a stronger part in OA.

There is no doubt that voice mail has been a serious disappointment to many of its early backers. A *Business Week* article from 1980, in the first wave of enthusiasm, quoted one industry analyst confidently predicting a $500 million voice mail market by 1985. Although difficult to estimate, the market is perhaps 10% of that size at present. Voice mail may be poised for rapid growth; even so, the half-billion-dollar mark is probably a ways away.

In addition to being stigmatized as a gold-plated answering machine, what are the other reasons voice mail has not taken off? Cost has been a factor, even for organizations that realize its capabilities extend well beyond those of the answering machine. Until fairly recently, the smallest feasible configurations of voice mail systems have easily involved capital outlays of $100,000 and up — a sum that is difficult to justify in most organizations.

One ploy used by several vendors to get around capital spending constraints is to offer their products on a service bureau basis. For a relatively modest monthly charge, an organization can rent voice mailboxes to try out the system One vendor, VMX, Inc., of Richardson, Texas, even throws in toll-free in-Wats service to its system as part of a 90-day trial period. Voice Mail International (Santa Clara, Calif.) takes the service approach a step further and makes message delivery service available to anyone, billing on a per-call basis to a major credit card.

Users who have managed to have systems installed generally report favorable economics, however. One user recently noted both hard-dollar and soft-dollar benefits: "There has been a great reduction in long-distance phone calls. We're much more conscious of not getting in touch with other people who don't have voice mail. You just don't realize how much time you spend making duplicate phone calls until you start using a voice mail system. Suddenly, you're getting work done in a day that used to take you half the week."

Evidence also seems to indicate costs are coming down. (This is partly a function of declining storage prices; digitized speech takes up a lot of bytes.) For example, Octel Communications Corp. of San Jose Calif., has recently entered the market with the Aspen system; the company claims it can support up to 1,500 users at a per-user cost of less than $100.

Another and potentially more serious objection is that voice mail systems have not typically been easy to use. The telephone keypad is a wonderful and virtually self-explanatory instrument for dialing numbers; it is not a very good way of entering control codes for "read message," "send message," and so on. If you consider how most people slow up to dial one of the rare remaining numbers with an alphabetic component, it should be clear that the keypad is not a good substitute for an alphanumeric keyboard, which means mnemonic codes are out. Templates over the keypad are not very helpful either; in any event, they may be competing for the same space with a PBX feature template.

The solution is to have the system give the user verbal prompts: "To file this message, press 1; To delete the message, press 2" and so on. Verbal prompts can make using the system slow, so most systems allow advanced users to bypass them. Voice mail systems can be easy to use after you become an expert, which is all right Recall, however, that the whole point of the telephone was everyone is supposed to be an expert user already; if you have to learn to become a skilled user, much of voice mail's advantage over terminal-based systems evaporates.

Voice mail is still far from dead, even if it has failed to live up to original expectations and continues to have some nagging ease-of-use problems. As prices decline and integration with other office technologies like computer-based electronic mail systems becomes more practical, voice mail should play a stronger part in OA. For example, it would be very useful to have a genuinely integrated message system that would make available to the user, with a common interface, all messages — text or voice — that have been received and are waiting.

Speech synthesis, the conversion of digital impulses to understandable speech, suffers from a surfeit of gimmicks ranging from talking Coke machines to copiers that tell you to add paper. The advantage of using speech synthesis instead of indicator lights is so dubious that the entire technology seems to have given rise to more jokes than serious office applications.

Nevertheless, many companies, most notably Digital Equipment Corp., have been developing commercial speech synthesis products. Dectalk, introduced last

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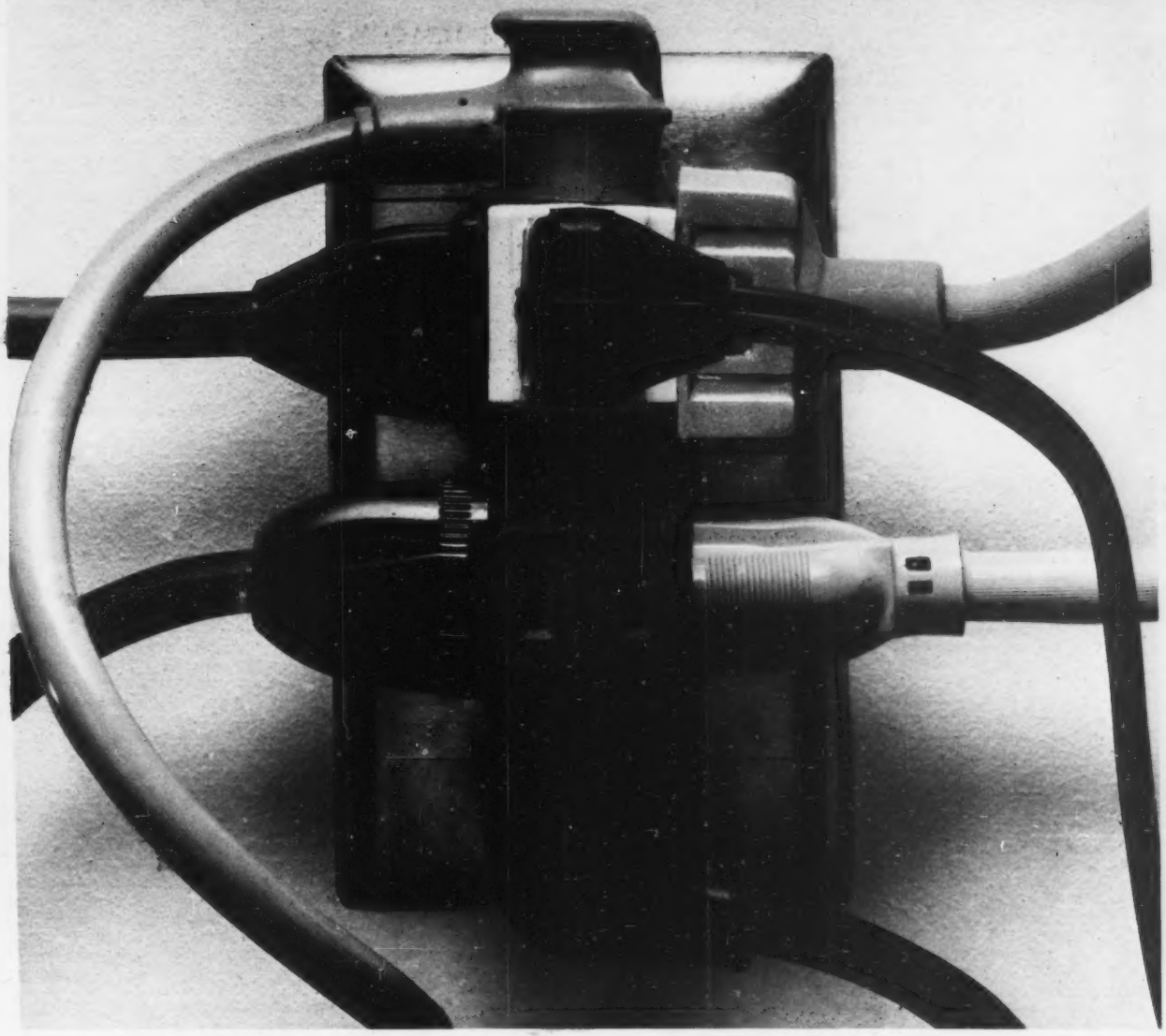

When most companies move into office automation, the first thing they do is plug in a computer and some peripheral equipment.

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year, is a hardware product that might be thought of as a voice printer; it accepts character-coded digital input and produces synthesized speech as an output.

Several choices of voice type — male, female and even a child's voice — are available, and versions are now or reportedly soon will be available in most major Western languages. Dectalk gives the impression of being a product in search of a compelling application.

Speech synthesis is unlikely to be a major component of the voice revolution in OA.

Although certain applications — such as DEC's use of a Dectalk-equipped terminal for a blind programmer — are obvious, they don't represent major markets. Others — reading electronic mail to a user over the telephone, for example — are plausible, but they need some development.

To date, DEC's major benefit from Dectalk may be all the floor traffic it has drawn into DEC booths at trade shows.

Speech synthesis is unlikely to be a major component of the voice revolution in OA. At best, it will fill some unique and otherwise unservable needs.

If speech synthesis is relatively easy to do but not very useful, the opposite is true of its mirror image, speech recognition. People have no trouble coming up with applications for speech recognition, but it is very difficult to do.

A great deal of research is going on in speech recognition, and the techniques used vary significantly. The most common approach is to take spoken input, break it down into components and match these against previously stored patterns that correspond to words. Thus, if a sound input matches the stored pattern for "delete" at an acceptable degree of closeness, the digital character string for "delete" will be output.

Some systems are referred to as "speaker-dependent," in that they are "trained" by an individual. Training consists of speaking words repeatedly to let the machine take enough samples to develop a good average to use as a pattern for future matching. An individual is likely to show less variation in the way "cursor" is pronounced than is the population at large.

For this reason, it is easier to make accurate speaker-dependent systems than it is to make speaker-independent systems, which in theory can understand anyone. Speaker-independent systems take large numbers of samples from a statistically representative group of speakers and create patterns from them.

Whether a system is speaker-dependent or speaker-independent, there is a trade-off between size of vocabulary and speed of operation (or processing power required).

Although some optimization is possible, matching a digitized input sound against the stored patterns takes time: The larger the potential vocabulary, the longer it takes to check out each sound.

Developing a system that recognizes discrete words involves significant technical difficulties. These difficulties are multiplied many times in so-called "continuous speech" systems, in which speakers are not asked to

pause after each word, but can speak normally. Continuous speech systems — which are still in the laboratory — would have to decide when words end and make allowances for the variations in pronunciation that result from verbal context. For example, "the" is pronounced differently in "the end" from the way it is pronounced in "the dog." Continuous speech recognition is a massive problem in artificial intelligence and promises to delay for some time everybody's favorite office fantasy, the dictating word processor.

Practical discrete word speech recognition systems have been commercially available for several years and are routinely used in factory applications and others where an operator's hands and eyes are both busy — product inspection, materials handling, package sorting and so on. Office products are beginning to emerge. Supersoft, Inc. (Champaign, Ill.) will shortly be introducing a voice-activated spreadsheet program for the IBM PC which will reportedly enable the user to input numbers and commands by voice. Texas Instruments will also be introducing a speech-activated personal computer, and others are likely to follow.

There is no doubt that practical and relatively inexpensive voice interfaces can be developed for personal computers and workstations. Improvements in digitizing and pattern matching algorithms, coupled with dedicated speech input microprocessors, could make such interfaces competitive with mice or touch screens within a year or two. The question that remains to be answered is whether or not this is a way that people will want to interact with a terminal.

Some of us would feel funny talking to a terminal, and others work in situations where talking would be distracting to others. Even leaving these problems aside, it is doubtful that speech control and limited input would offer a significant enough advantage that it would become the interface of choice for most users.

People have no trouble coming up with applications for it, but speech recognition is very difficult to do.

Voice processing clearly has a role to play in the office, since it is a major mode of information transfer. As the integration of data, text and image proceeds, it will be increasingly perceived as undesirable to maintain a separate stream of voice-based information. Some barriers to the integration of voice are technological: speech recognition, for example. In other cases, as with speech synthesis, the barriers are the lack of obvious and compelling applications — essentially a marketing problem.

Both the technological and the marketing barriers to more complete voice integration can be overcome and probably will be fairly soon. However, fully integrated voice processing is not the sole key to achieving the blissful state of automation that seems to have eluded us to date. It will be one key, but only to the extent that users perceive voice processing as solving genuine business problems. OA

Elliott is director of research for International Data Corp., a consulting and research firm based in Framingham, Mass.

JOHN KILROY

ERGONOMICS:

HOW ARE THE VENDORS MEASURING UP?

BY GLENN RIFKIN

For office automation vendors, the furor over ergonomics has become impossible to ignore. Ergonomics has, however, become an umbrella term tossed around when discussing everything from CRT radiation to user-friendly interfaces.

Though a much-studied discipline since World War II, ergonomics is often assumed to be an outgrowth of the computer age. Whatever its origins, ergonomics has evolved into a major office issue and end users are turning to vendors for answers.

As the technology has advanced in recent years, the focus on end-user computing has increased tremendously, bringing with it greater concern for the user interface and the total office environment.

Nearly all the major office vendors have in-house human factors groups; those that don't, have turned to outside industrial design firms for guidance. Industry analysts agree, however, that vendors have a lot further to go before their products can be rated ergonomically perfect.

The following is a sampling of what some of the major office vendors are doing about ergonomics.

IBM: Dr. Richard S. Hirsch, IBM's human factors program director, has been involved with ergonomics for more than 30 years; he oversees more than 15 labs, some of which have as many as 30 human factors engineers on staff. IBM is conducting research in all areas of ergonomics, including vision, cognition and other human factors.

Hirsch, like the majority of other human factors engineers, is unconvinced that health-related charges about CRTs have any basis in fact. IBM research has shown none of the charges to be valid.

He believes ergonomics has become an "advertising buzzword" and the true ergonomic issues in product design and function have not changed.

The human factors groups at IBM generally act as service groups for engineering. After a product is configured by engineering, human factors specialists will identify areas of concern for investigation. Products will have human factors input through all stages of development, as well as after they are in the field, Hirsch said.

"Our primary concern is to make it easy to learn to use the equipment. The process must be relatively simple and the documentation understandable. After that, we can decide what can be changed to make the equipment easier to use," he said.

IBM tests its products with users outside the company. "There are those in-house who can make anything work," Hirsch said. He also predicted that current products, such as the IBM PC, would not change ergonomically, but that future products would incorporate greater function and interaction. Interfaces such as the mouse and the touch screen were nice ideas, he said, but it was not clear "that they offer a better across-the-board solution to all applications."

Digital Equipment Corp.: Dr. Charles Abernethy, DEC's manager of human factors, has degrees in both psychology and engineering, a combination that forms the backbone of ergonomic design. "My job is to help design products to be both comfortable and productive," he stated.

At DEC, the six human factors engineers are part of the industrial design department working in conjunction with a staff of industrial and graphic designers on each new project. Out of this collaboration has come DEC's personal computer series (which won an industrial design award at the Hannover Fair in Germany in 1983) as well as the new VT 200 terminal (which won a similar award at the 1984 Hannover Fair).

Abernethy pointed out three areas of consideration for ergonomic design:

• Visual, which encompasses the glare off the screen, the incorporation of tilt and swivel to the terminal and screen management (the layout and organization of the screen).

• Keyboard, including the height and width of the keyboard, whether it is detachable and the design and layout of the keycaps.

• Psychological concerns, which covers the expectations of the user vs. the reality of actually running the system. This area is particularly crucial in the office where many workers have not used systems before.

DEC has taken an active stance on informing its customers about ergonomics through customer brochures. According to Abernethy, "You can design the best ergonomic machine, but it will do no good if it isn't set up properly." DEC has also become involved in ergonomic furniture design.

Abernathy believes that the health issues are "very real," but that often the problem lies with a system that has been improperly installed or a user who has misdiagnosed the problem. "People might get headaches and think the cause is radiation from the terminal, when, in fact," he said, "a third of those people should have gone to the eye doctor three years ago."

Wang Laboratories, Inc.: At Wang's Advanced Systems Laboratory, (ASL) the ergonomic issues focus on humans first and technology second, according to Dr. Verneil Munson, director. The ASL, founded two years ago, has 20 employees who start with "our perception of human needs and then figure out what the technology can do to help."

ASL works in conjunction with all research done at Wang — the design of terminals, keyboards, screens and user interfaces — and though product designers are not required to consult with the ASL, they all do anyway, according to Munson. "We're willing to change our products with customer suggestions. At our beta-test sites, we can quickly integrate modifications or changes suggested by our customers," she said.

ASL itself serves as a test site for Wang products, Munson pointed out, which gives them an advantage in understanding the user problem. She also described the product-dependent testing done by Wang, which tests the products with many different groups of potential users.

Munson acknowledged that Wang has been examining new user interfaces such as the mouse, touch screen and, in particular, voice. She cautioned, however, that the product must solve a real problem and that the user interface can be just a gimmick if it gets in the way of solving the problem.

Hewlett-Packard Co.: HP recently took an innovative ergonomic step by unveiling its HP 150 microcomputer with a touch-screen interface. The HP 150 microcomputer system, reportedly the first office product to offer this interface, is targeted at users who are wary of keyboards. According to Wanda Smith, human factors engineering manager for HP, the touch screen is a quantum leap in adapting office products to user needs.

HP was aware the touch screen would draw criticism from users who prefer the keyboard interface, so the HP 150 offers both touch screen and keyboard options. Smith predicted the touch screen would someday lead to a variety of interfaces, such as voice and holograms, on future HP products.

According to Smith, HP has made a serious commitment to ergonomics, from the president on down. Approximately 70 human factors engineers on staff are involved in everything from hardware and software design to product safety. HP also funds outside research, such as two recent cooperative efforts costing more than $100,000 to study glare-control devices. HP and IBM are cosponsoring another study on ergonomics and OA.

"Our key consideration is to offer customers products with more than just the minimum requirements," Smith said. The minimum requirements, according to HP, are a detached, low-profile keyboard, dark characters on the keypad, a tilt-and-swivel terminal, good character resolution and user-friendly software.

HP is also committed to educating its marketing department about the importance of total ergonomic design so that it can inform customers how best to set up a system.

Xerox Corp.: Though Xerox has stumbled recently in its OA efforts, the company has been a leader and innovator in the study of ergonomics. Through its Palo Alto Research Center (Parc), Xerox developed such technologies as the mouse interface, windowing software, high-resolution screen and the Ethernet local-area network. Research at the Office Products Division in Dallas added the use of icons to the company's product line.

According to Claude Hutchenson, manager of industrial design and human factors for Xerox, the company has been committed to human factors research for more than 15 years. Hutchenson has 15 people on his Dallas staff and Xerox has human factors groups at many of its regional sites. A group at corporate headquarters in Stamford, Conn., is devoted to studying health and safety issues.

Hutchenson's group gets involved in product design early in the development stages, even before marketing and engineering take over. The concepts come from both an industrial design and human factors point of view; the two disciplines often overlapping. "The basic question is 'How does the product fit in the office?' " he explained.

Xerox also does comprehensive ergonomic testing on its products; typically outside the company. Hutchenson said he has carefully monitored European standards and the eventual product lines have had input from those standards as well as from Xerox production groups around the U.S.

Though Xerox is not conducting its own health and safety research, Hutchenson closely monitors studies done by outside agencies such as the National Institute of Occupational Safety and Health (Niosh).

Data General Corp.: Not unlike its competitors, DG's ergonomic goal is to "make its products easier to use in order to increase productivity," according to Randy Mazzei, mechanical design manager in DG's Austin, Texas, facility. Mazzei, who oversees the ergonomic design with a staff of nine engineers, is responsible for the look of all DG's printers, terminals and mass storage devices.

"We think specifically of the end user, what is on the desk and how our product will fit in. We're the newcomers to the desktop so we don't want to get in the way," he said.

Though not specifying which direction DG would go ergonomically, Mazzei admitted the company was studying the mouse and touch-screen interfaces. DG hasn't committed itself to anything yet, however. "We don't want to fall into a trap of ergonomics just for the sake of ergonomics," he stated. "Data General wants to make the user interface consistent for our customers."

At DG, according to Mazzei, form follows function. The engineers must determine how a product is going to be used, how to arrange its components to be comfortable for the user and how to integrate certain pieces of hardware that already have given dimensions. "After this, we decide how we can orchestrate all this to be a useful product. It starts at the function level," he said.

Apple Computer, Inc.: Apple's personal computers have made their way onto countless office desktops, and the company's latest product, the Macintosh, is aimed squarely at that market. Apple doesn't have an in-house ergonomics group; each product engineer has background experience in human factors so that he can oversee various aspects of design during development.

Jerry Manock, product design manager for the Macintosh, pointed out that if the same person carries the design all the way through a project, the original ideas won't get lost in the shuffle. For the Macintosh, Manock paid close attention to creating a softer image, without sharp edges, to make the product inviting to use. Particular attention was paid to integrating the entire package into a small, practical system that wouldn't leave a large footprint on the desktop.

Among the areas of concern were where to place the disk drive, where to position the screen for a more flexible line of sight, how to avoid glare on the screen and how wide to make the disk slot to avoid pinching fingers.

The Macintosh, like its predecessor the Lisa, integrates the single-button mouse interface and has a high-resolution screen complete with icons and windowing capabilities for ease of use.

Manock said he believes that the mouse offers an excellent interface and that Apple will not offer touch screen as an alternative. "Your arm gets really tired pointing at the screen all day," he pointed out. Unlike Xerox with its two-button mouse, Apple went through "great pains" to create a single-button mouse. "People were confused by two buttons," Manock claimed.

Apple does extensive testing, both in-house and outside, before it proceeds with marketing a product. Keyboard design, for example, received high priority research for the Macintosh. "We tried to discover what factors are important to keyboard design," Manock explained. "We found there were 200 factors involved, so we tried to isolate the five top concerns, such as shape of the key, graphics and symbols. It's still a very subjective thing." OA

Nearly all the major office vendors have in-house human factors groups; those that don't, have turned to outside industrial design firms for guidance. Industry analysts agree, however, that vendors have a lot further to go before their products can be rated ergonomically perfect.

Rifkin is senior writer at Computerworld OA.

OA
TECHNOLOGY

IBM Cabling System

RYE BROOK, N.Y. — **IBM** introduced a major component of its future local-area network, the IBM Cabling System, which reportedly can be used instead of coaxial cable for wiring computer devices within a building. The long awaited network becomes an immediate de facto standard upon which IBM's competition is expected to base future products. The new system is permanently wired, just as phone lines are run in buildings, with connections made to outlet plates in office walls.

The Cabling System, according to IBM, will eventually serve as the medium for a token-ring local-area network that will be developed within two to three years.

The system, scheduled for October, permits traditional types of connections to be made among devices with a common cable consisting of twisted pairs of copper conductors. The standard includes baseband all-digital transmission, shielded twisted-pair wires and/or fiber-optics medium, a star topology and an implicit token-passing ring access protocol. Prices for the transmission cables used in the system average 50 cent/ft. For more information contact IBM, 900 King St., Rye Brook, N.Y. 10573.

PACIFIC GROVE, Calif. — Concurrent PC-DOS, an operating system that reportedly increases the power and versatility of the IBM PC, was introduced by **Digital Research, Inc.** Concurrent PC-DOS can run up to four PC-DOS or CP/M application software programs at a time and also includes features said to improve user interface and shorten the time needed to learn to use the PC, as well as capabilities for data communications, windows and productivity tools.

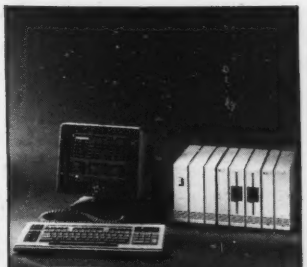
Concurrent PC-DOS will be available in the third quarter of this year for $295, Digital Research, Inc. said from 160 Central Ave., Pacific Grove, Calif. 93950.

BURLINGTON, Mass. — The Electric Desk, an integrated software package for the IBM PCjr, was introduced by **Alpha Software Corp.** The product combines word processing, spreadsheet analysis, data base management and communications and is reportedly a multitasking program featuring windows, a macro programming language and Help screens.

The Electric Desk is also available for the IBM PC and the PC/XT. It requires 128K bytes of random-access memory and one disk drive. It costs $295, Alpha Software Corp. said from 30 B St., Burlington, Mass. 01803.

PALO ALTO, Calif. — **Hewlett-Packard Co.** announced its HP 110, a battery-powered, full-function, 16-bit briefcase-size portable personal computer. The portable, with its 16-bit Intel Corp. 8086 microprocessor, runs on the MS-DOS operating system and has 278K bytes of random-access memory and 384K bytes of read-only memory (ROM). A library of built-in application packages is included and the display supports bit-map graphics, the vendor said. The unit reportedly weighs 8½ lb. and has a 16-line, 80-char. flip-up LCD display. Among the software stored in ROM is Lotus Development Corp.'s 1-2-3.

The HP 110 is available for $2,995, the vendor said from 11000 Wolfe Road, Cupertino, Calif. 95014.



Burroughs B 25

DETROIT — **Burroughs Corp.** unveiled the B 25 desktop microcomputer system designed for the business market. Released with the B 25 is the XE520 shared resource processor, which complements and further expands the capabilities of the B 25 system, the vendor said.

The B 25 features 256K bytes of random-access memory, a 12-in. display, keyboard and dual floppy disk storage module. The operating sytems include the B 20 Operating System, MS-DOS and CP/M-86. The B 25 is available for $4,000 from Burroughs, 1 Burroughs Place, Detroit, Mich. 48232.

MANSFIELD, Mass. — **Codex Corp.** introduced its first local-area network available in either broadband or baseband, as well as a new series of high-speed modems featuring the Motorola 68000 processor.

The general-purpose local-area network is the first member of Codex's 4000 series of internetworking and network management products which will be introduced over the next three years. Compatible with Ethernet specifications, the Codex baseband local-area network can transmit data at speeds up to 10M bit/sec within a single facility or building group. In the broadband version, the transceiver is replaced by a radio frequency modem. The Network Management Facility and bridge are reportedly identical to those in the baseband offering. The 2600 Series modems are the first to utilize the 68000 processor as a controller, the firm said.

The 2600 series is available in prices ranging from $4,175 to $13,000; the local-area network will be priced between $450 and $750 per port, depending on configuration. For more information contact Codex, 20 Cabot Blvd., Mansfield, Mass. 02048.

NEW YORK — **IBM** announced three text processing programs for its personal computers, a number of PC links for office systems and an expanded System/36 small computer.

The new text processing programs — the Displaywrite series and PCWriter — reportedly enhance IBM PCs both as standalone word processors and as workstations. The Displaywrite series includes programs similar to those available for the IBM Displaywriter word processor. PCWriter is similar to text processing programs of IBM's 5520 Administrative System and the System/23 Datamaster.

Displaywrite 1, priced at $95 and designed especially for the PCjr, can be used with the PC, PC/XT and the Portable PC. The $299 Displaywrite 2 has a built-in spelling checker of about 100,000 words and runs on the PC, PC/XT, Portable PC and the 3270 PC. Displaywrite Legal Support, used with Displaywrite 2, contains a spelling directory of about 16,000 legal terms and costs $165. Displaycomm BSC is a binary synchronous communications program costing $375 that allows Displaywrite 2 documents to be transferred between PCs, PC/XTs, Portable PCs, Displaywriters and host computers. The $199 PCWriter includes a 120,000-word dictionary and can be used on the PC, PC/XT and Portable PC.

Any IBM PC, including one that is part of a cluster, can now exchange documents with an IBM Displaywriter for $495, according to the vendor. A letter-quality 5218 printwheel printer can be linked to a PC or PC/XT for $220 or shared by up to four of the computers for $625. A PCjr, PC or PC/XT can now reportedly be used as a videotex terminal to receive or send data, which can be stored on diskettes for later viewing. The program diskette costs $250 for the PC and PC/XT and $220 for the PCjr. A $200 program called Profs/PC2 allows incoming mail and Profs documents from an IBM 4300 series or other VM/370 processor to be stored on a PC diskette or tranferred to other PCs in the network, IBM said.

For information contact: IBM Information Systems Group, 900 King St., Rye Brook, N.Y. 10573.

NEW YORK — The Gazelle or System 75, a digital voice/data private branch exchange aimed at mid-sized businesses, was introduced by **AT&T Information Systems** (see Attis profile on Page 17). The system, designed for offices

AT&T System 75

with between 40 and 400 phone lines, reportedly offers all standard features in the main processor, and can transmit data at speeds of up to 64,000 bit/sec.

Standard features include simultaneous voice and data capability, six-way conferencing, internal messaging and a user-friendly, menu-driven system management capability that allows the user to custom configure. By interfacing additional processors, System 75 can be upgraded to offer the same management capabilities as AT&T's System 85 introduced last year.

The product, which can be linked with System 85 and Dimension PBX, will reportedly range in price from $600 to $900 per line including installation and terminals. It will be available in fourth quarter 1984 from AT&T Information Systems, 100 Southgate Parkway, Morristown, N.J., 07960.

MAYNARD, Mass. — In an effort to tie its microcomputer offerings more closely into the office environment, **Digital Equipment Corp.** made a series of announcements, including Decnet local-area networking for the Professional 350. DEC also announced a software package for both the Professional 325 and 350 that reportedly brings many features of the company's VAX/All-In-One office automation software down to the desktop micro.

DEC announced it had replaced the Rainbow 100 with a more powerful floppy disk version — the Rainbow 100B — which will sell for the same price, $3,500 with keyboard and monitor. DEC also announced Poly-BSC/RJE and Poly-BSC/3270 Binary Syn-

chronous Communications programs allowing Rainbows to emulate IBM 2780/3780 and 3270 terminals. The Poly-BSC/RJE program is available for $500 and the Poly-BSC/3270 for $595

In addition, the company introduced A-to-Z Integrated System, a multiuser software package aimed at the OEM market, that utilizes an open architecture design to integrate third-party software applications with standard business applications. The new package consists of a multiuser-base system layered onto Digital's Micro/RSX operating system which includes a menu and system management features and an integration kit that provides software routines to create A-to-Z applications. A license for A-to-Z is priced at $1200, with individual module licenses priced beginning at $400.

The Pro/Decnet software is available for $95. The Digital Equipment Local Network Interconnect is priced at $985 and the Pro/Office Workstation software package for $950 from DEC, Maynard, Mass. 01754.

CAMBRIDGE, Mass. — **Computer Corp. of America** (CCA) announced Prod/Net, an office automation software package that reportedly integrates personal computers, peripherals, word processors and mainframe computers into a single communications system using existing hardware and technologies.

Prod/Net integrates both a microcomputer software package called Desktop with mainframe software called Host/Net. Desktop offers a variety of OA applications to Prod/Net users, including electronic mail, In/Out basket management, individual and group directories, calendar, tickler and electronic filing. The product also includes WP software called Dart, which reportedly ties together an organization's existing WP systems with those of other vendors. Also available is a microcomputer software module called Work/Net, which connects PCs into a local-area network and also allows users to share peripherals, disks, printers and communications lines.

Prod/Net is available as a standalone system or as an integrated subsystem of CCA's Model 204 Database Management System. Host/Net is priced at $125,000, Work/Net at $55,000 for 10 workstations and Dart at $10,000 per WP interface. Prod/Net is scheduled for the fourth quarter of this year from CCA, Four Cambridge Center, Cambridge, Mass. 02142.

NEW YORK — Ilink, a dictionary-driven software transfer program that reportedly allows users to download, upload or cross-load data files from IBM PC data base and spreadsheet applications to IEM mainframe information center products was introduced by **Infocenter Software, Inc.**

The product is compatible with PC programs such as Lotus 1-2-3, Visicalc, Supercalc, and Dbase II and runs on any IBM PC, PC/XT, or PC-compatible with at least 128K bytes of memory, according to Infocenter Software.

Ilink comes with magnetic tapes for two data base links, 10 PC diskettes, documentation and tutorials and is priced at $12,500 from Infocenter Software, 171 Main St., New Paltz, N.Y. 12561.

WESTFORD, Mass. — **Interlan, Inc.** introduced a single-board communications controller that reportedly provides link-level connection for any multibus system to the industry-standard Ethernet/IEEE 802.3 local-area network.

The NI3210 board is supported by Unix networking software packages from Interlan, Inc., Network Research Corp. and Unisoft System Corp. and is targeted to provide OEMs a plug-in networking solution. The NI3210 features an advanced multibus interface architecture that ensures both high throughput communications and integration into any multibus host system, the vendor said.

The product is available for $760 from Interlan, Inc., 3 Liberty Way, Westford, Mass., 01886.

The Apple IIe

CUPERTINO, Calif. — **Apple Computer, Inc.** expanded its Apple II line with the introduction of a 7½-lb portable, which, although aimed primarily at the home computer market, is also appropriate for small businesses, according to the vendor. The Apple IIc has 128K bytes of built-in memory, 16K bytes of read-only memory, and features a full-size keyboard and a floppy-disk drive in one unit.

The IIc reportedly runs more than 90% of the programs for the IIe; 10 productivity packages have been developed for the IIc by third-party firms and Apple. A thermal printer, mouse, monochrome monitor and tilting stand are available for the IIc, along with existing modems and Imagewriter dot matrix printer. The basic unit, without a CRT monitor, costs $1,295 from Apple Computer, Inc., 20525 Mariani Ave., Cupertino, Calif., 95014.

LOWELL, Mass. — **Wang Laboratories, Inc.** entered the videotex market by unveiling a software package for their Professional Computer. The Professional Computer Viewdata Decoder provides access to videotex information encoded in the Prestel protocol. Products suporting NAPLPS, Teletel and Cept protocols will be available at an undisclosed date, according to the vendor.

The product, which runs on any Wang Professional Computer configuration, retrieves videotex frames of text and color graphics and can store about 2,500 frames on the Professional Computer's Winchester disk and 300 frames on a diskette. The Decoder is priced at $250, Wang said from One Industrial Ave., Lowell, Mass., 01851.

EL SEGUNDO, Calif. — **Xerox Corp.** introduced a set of protocols and formats that reportedly enables office machines from different manufacturers to produce documents on a wide variety of electronic printers.

The Interpress Printing Architecture provides a way for different manufacturers to use common programs to link their products with almost any raster printer. It allows users to create documents in any layout, containing any combination of line graphics, half-tones, scanned images and text in any font size or style. The set of documents specifying the Interpress Printing Architecture is available for $250 from Xerox Office Systems Division, 3450 Hillview Ave., Palo Alto, Calif., 94304.

GLENVIEW, Ill. — The popular IBM PC-compatibles market was joined by **Zenith Data Systems Corp.**, which unveiled both a desktop and a portable unit. The units, which will be available in five configurations, are based on the Intel Corp. 8088 microprocessor and offer from 128K to 640K bytes of random-access memory.

The desktop unit, the Z-150, is available with a single or dual 5¼-in. floppy disk drives and will retail for $2,699. The portable unit, the Z-160, comes with either single or dual floppy disk drives, weighs 30-lbs, has a built-in 9-in. monitor and retails for $2,799 from Zenith Data Systems, 1000 Milwaukee Ave., Glenview, Ill. 60025.

NEW YORK — **Sord Computer of America, Inc.** introduced a briefcase-size , 4-lb., 6-oz. computer that is said to offer multiwindowing capability and integrated software. The Consultant features six function keys (data handling, calculation, word processing, communications and Help) and an 8 by 40 bit-mapped LCD display with angle adjustment.

User memory is 32K bytes of nonvolatile read-only memory, expandable to 64K bytes. Mass storage is provided by a high-speed

Sord's Consultant

recorder, each tape storing up to 128K bytes of data. The Consultant uses rechargable Nicad batteries and can operate up to 8 hours on one charge. Accessories include a thermal printer, numeric keypad with 16 additional function keys, 3½-in. floppy disk drive, bar-code reader, and Basic programming module. A model with a built-in modem will be available in September, according to the vendor. The base model costs $995 from Sord, 645 Fifth Ave., New York, N.Y., 10022.

FORT LAUDERDALE, Fla. — **Harris Corp.** introduced a low-end superminicomputer reportedly aimed at office automation and computer-aided engineering applications. The Harris 60, a 32-bit supermini, is the company's first system that does not require a raised-floor computer room. In its basic configuration, the Harris 60 is packaged in a desk-high cabinet; has a two-board CPU, a communications controller that can accommodate up to 16 lines and an 80M-byte, 8-in. Winchester disk drive; and employs 256K-bit memory chips to achieve a main memory capacity ranging from 768K to 12M bytes, according to the vendor.

The Harris 60 was designed to use the company's VOS operating system and is said to be both hardware and software compatible with other Harris processors. The Harris 60 is available for $69,500 from Harris Corp., 2101 W. Cypress Creek Road, Fort Lauderdale, Fla. 33309.

BOULDER, COLO. — Calling it 100% functionally and operationally compatible with the IBM PC, **Otrona Advanced Systems Corp.** introduced its Otrona 2001 portable computer. The portable weighs 19 lb and measures 7-in.

The Otrona 2001

OA FORUM

HAMMERING IT OUT

By Michael Hammer

"Hammering It Out" will be a regular feature in Computerworld OA *and will attempt to give readers a look at the lighter side of the developing world of OA.*

Ours is a business culture that prides itself on rationality. Sentiment, wishful thinking and imprecision are not to be found in the lexicon of the American manager. The perfect example of this rational world view is cost-benefit analysis — the process whereby the advantages of a particular course of action are precisely calculated and impartially compared with the similarly computed costs. It is an essential tool of modern business, and the mill through which half-baked ideas are ground into dust.

The official view is that cost-benefit analysis is an algorithmic process, relentlessly performed by steely-eyed executives with computer-like brains and ice water flowing in their veins.

Reality is somewhat more complex and richly textured. The practical use of cost-benefit analysis is effectively illustrated by a story related by my colleague Cyrus (Chuck) Gibson, a vice-president of Index Systems, Inc., and a former Harvard Business School professor. While at Harvard, Chuck was engaged in a study of decision-making processes in the banking industry and visited a large bank to explore how they determined where to site new branches. He was referred to Fred, a vice-president responsible for such matters. Fred regaled Chuck with tales of intricate demographic studies and detailed return on investment computations. He also exhibited, as proof of his thoroughness and precision, an array of forms whose completion would relentlessly expose all the pros and cons of a particular candidate site.

Chuck was duly impressed; but Chuck knows something of the ways of the world and resolved to confirm his discoveries with the chairman. Ushered into the august presence, Chuck asked how the bank determined where to place new branches. The chairman indicated that each situation was unique, but offered to describe a typical one.

A few weeks prior, one of the chairman's old colleagues, a name in the local banking industry and head of a rival bank, had died. Just the other day, the friend's son had called to say he had no interest in banking and would like to sell all his branches to the chairman and his bank. "And, of course, I agreed." Chuck was somewhat taken aback. What about Fred, and the demographics, and the cost-benefit analysis, and the forms? "To be sure," replied the chairman. "First we decide what we want to do, and then Fred fills in the forms."

The official view is that cost-benefit analysis is an algorithmic process, relentlessly performed by steely-eyed executives with computer-like brains and ice water flowing in their veins. Reality is somewhat more complex and richly textured.

The truth is that, in most large U.S. organizations, cost-benefit analysis is a fraud. We do not seat ourselves in front of a calculator or a spreadsheet with an open and uncertain mind, waiting for the result of the computation to tell us "Yea" or "Nay." In reality, cost-benefit analysis is an ex post facto justification for what we had already decided to do. We religiously add up the numbers to demonstrate that they support our decision. If they have the temerity not to do so, then we will go back and exchange them for better ones that do support us.

For a demonstration of cost-benefit analysis run amok, we need look no further than many firms' OA plans. Any number of otherwise rational companies still seek to compute the benefits of an OA system by means of assigning dollar values to expected time savings.

The flaws in this method of analysis are so glaring and well-established they scarcely bear repeating: First, there is no particular reason to believe that improving the efficiency with which office tasks can be performed will yield saved time (as opposed to simply more tasks performed in the same time).

Second, even if an individual's time is "saved," that does not translate into projected dollar savings unless the individual's salary is reduced proportionately — an extremely unlikely event. (I am still wondering how a certain firm intended to achieve the reduction of one-third of a secretary called for in their plan; which third?) Nonetheless, despite the fact that everyone recognizes the nonsensical nature of such analyses, they can still be found in the "justification" section of many OA plans.

As usual, the mumbo-jumbo, hypocrisy and comedy surrounding cost-benefit analysis indicate something is seriously amiss. The fundamental flaw is a misapprehension of the major benefits that can be realized through the use of modern OA technology. Although some cost-displacement does often occur, it is rarely enough to justify the acquisition of an office system.

The real benefits of an office system in general will be multidimensional and will relate to improving the performance of the organization in ways most important to the realization of its mission. These may include cost-reduction, but more frequently will encompass such areas as customer service, cash flow, error rates, employee morale and rate of innovation. To call these unquantifiable and intangible is incorrect. Benefits in these areas are both real and measurable. They simply cannot be calibrated in terms of reduced expenditures. Forcing all OA benefits into the Procrustean bed of cost-reduction is short-sighted and self-defeating.

Cost-benefit analysis in fact is not a rational decision-making process; it is a social process, by which seemingly incontrovertible facts are marshalled against the day that a decision proves to have been a stinker. At that time, the decision-maker can retrieve his analysis and demonstrate to all that his choice was sound and scientific and that the subsequent difficulties were the work of gremlins.

It also has a psychological dimension. Seeking safety in seemingly rigorous cost-benefit analysis is a natural response for an organization confronting a new technology, with whose benefits and consequences it is not yet familiar. A retreat into formality is a defense mechanism; we try to conquer our fears of the unknown with detailed computations.

This social-psychological theory is the only one that can possibly account for the ludicrous lengths to which some firms go in attempting to justify their OA expenditures. The implications of this theory have yet to be explored. They might well indicate that other forms of analysis (forms usually associated with couches, Viennese accents and 50-minute hours) might be indicated for those who set overly great store by the cost-benefit variety. OA

Hammer is president of Hammer and Co., Inc., a Cambridge, Mass., consulting firm that specializes in the strategic implications of new information technologies.

TECHNOLOGY

by 15-in. by 14-in., reportedly one-third the weight and volume of other transportables on the market.

The 2001 is equipped with one 48 TPI disk drive, an 8088 microprocessor, 128K bytes of random-access memory, a 7-in. flat screen amber display and one RS-232 serial asynchronous port. Up to three PC-compatible boards can be loaded into the Otrona expansion chassis.

The CRT can be adjusted to four different height levels for convenient viewing and the unit can be upgraded to a desktop personal computer by adding a 13-in. color or 12-in. black-and-white display. The Otrona 2001 is available for $2,495 from Otrona, 4725 Walnut St., Boulder, Colo. 80301.

SAN JOSE, Calif. — A local-area network that can reportedly connect up to 64,000 IBM PCs was introduced by **Santa Clara Systems, Inc.** The PCnet, designed especially for the IBM PC, features a single slot adapter board that plugs into each networked PC, has a transmission rate of 1M bit/sec and is compatible with PC-DOS Version 1.1 and 2.0, according to the vendor.

The net uses standard 75 ohm coaxial cable which can be run up to 7,000 feet. Built-in software incorporates disk sharing, file locking and multitasking into the PCnet. A network starter kit costs $1,529 from Santa Clara Systems, Inc., 1860 Hartog Drive, San Jose, Calif. 95131.

ANN ARBOR — **ADP Network Services** unveiled an integrated management software system for planners and project managers using Unix-based or compatible micros, minis or mainframes. The Apecs/8000 incorporates a relational data base management system and features earned value analysis, critical path analysis, application building techniques, work breakdown and organization structure consolidation, according to the vendor, as well as a full range of data entry screens, report writing, and graphics capabilities.

The Apecs/8000 runs under the Unix operating system (or Unix emulator) in such machines as the Digital Equipment Corp. VAX and Onyx and is designed to facilitate the top-down/bottom-up approach to planning and control. It is priced at $150,000 from ADP Network Services, Inc., 175 Jackson Plaza, Ann Arbor, Mich. 48106.

CALENDAR

June 13-16, Atlanta — **MSA's Interact Conference.** Contact: Tom Crawford, MSA, 3445 Peachtree Road NE, Atlanta, Ga. 30326.

June 14-15, Newport Beach, Calif. — **Advanced Dbase II Programming.** Contact: Personal Computer Management Association, 11928 N. Earlham, Orange, Calif. 92669.

June 18-19, San Diego — **Personal Computer Local Networks Seminar.** Also, June 28-29, Boston; July 11-12, San Francisco. Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.

June 18-19, New Jersey — **Lotus 1-2-3.** Also, June 21-22, Anaheim; June 25-26, Cincinnati; July 9-10, Atlanta; July 16-17, St. Louis. Contact: Personal Computer Management Association, 11928 N. Earlham, Orange, Calif. 92669.

June 18-22, Cambridge, Mass. — **Office Information System Software.** Contact: Director of the Summer Session, E19-356, MIT, Cambridge, Mass. 02139.

June 19, 20, New York — **Office Systems: Integration Through Communication.** Also, June 26, 27, California. Contact: Lisa Caruso, The Yankee Group, 89 Broad St., 14th Floor, Boston, Mass. 02110.

June 19-21, Ill. — **COEE/OIS '84.** Contact: Janet Schafer, Cahner's Exposition Group, Cahners Plaza, 1350 E. Touhy Ave., P.O.Box 5060, Des Plaines, Ill. 60018.

June 20-22, Mich. — **Data Communications Networks: Planning and Computer-Based Design.** Contact: Marilyn Chasteen, The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

June 20-22, New Jersey — **Networking Personal Computers.** Also, June 27-29, Cincinnati; July 11-13, Atlanta; July 18-20, St. Louis; July 25-27, Chicago. Contact: Personal Computer Management Association, 11928 N. Earlham, Orange, Calif. 92669.

June 25-27, Boston — **Automating The Office: A Tactical Guide for Success.** Contact: Celia Neiman, American Management Associates, P.O. Box 319, Saranac Lake, N.Y. 12983.

June 26-27, New York — **Getting Results With Electronic Mail.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

June 26-28, New York — **PC Expo.** Also, Sept. 24-26, Anaheim. Contact: Ralph Ianuzzi Jr. or Jim O'Rourke, PC Expo, 333 Sylvan Ave., Englewood Cliffs, N.J. 07632.

July 9-12, Las Vegas — **National Computer Conference '84.** Contact: American Federation of Information Processing Societies, Inc., 1899 Preston White Drive, Reston, Va. 22091.

July 11-14, Dallas — **Nomda.** Contact: Irene Nelson, Nomda, 810 Lively Blvd., Wood Dale, Ill. 60654.

July 18-20, Chicago — **Syntopican XII.** Contact: Association of Information Systems Professionals, 1015 N. York Road, Willow Grove, Pa. 19090.

July 23-27, Minnesota — **Siggraph '84.** Contact: Siggraph '84 Conference Office, 111 E. Wacker Drive, Chicago, Ill. 60601.

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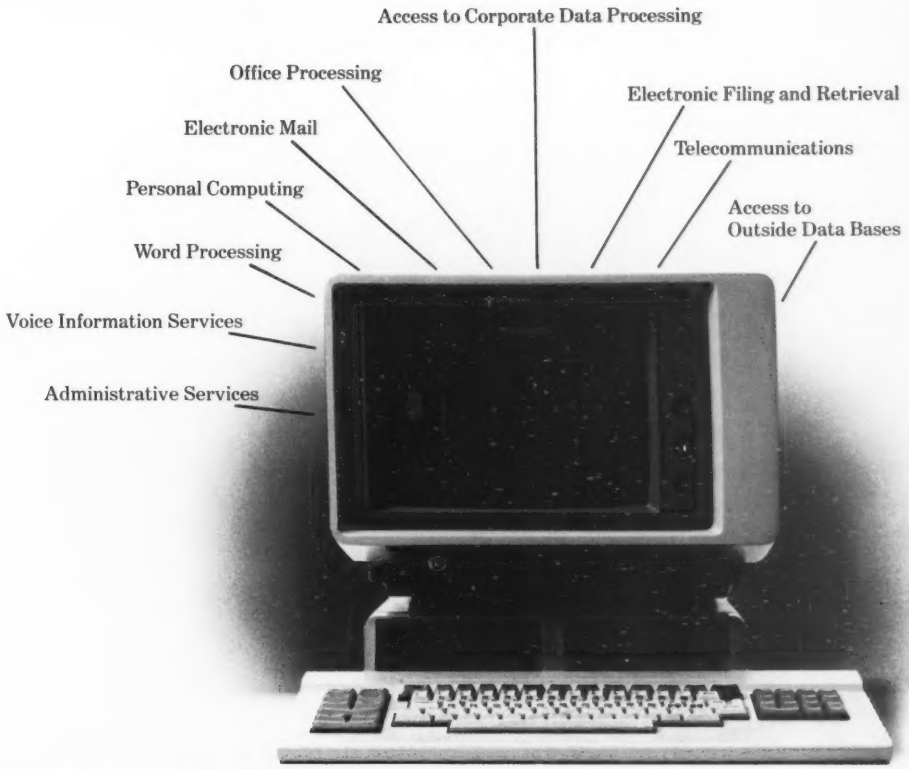

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